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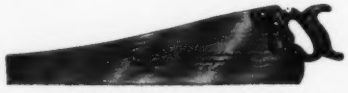
The INDUSTRIAL-ARTS MAGAZINE

NOVEMBER - 1927

The BRUCE PUBLISHING COMPANY
MILWAUKEE, WISCONSIN

ATKINS SILVER STEEL SAWS

School Supervisors Save School Money by Specifying Silver Steel Saws, Saw Tools, Specialties, Grinding Wheels and Machine Knives.



"THE 400" SHIP PATTERN

"The 400" is made of Silver Steel, Mirror Finish, Skew back, Solid Rosewood handle Perfection Pattern — prevents wrist strain. No. 401 is same except straight back.

ATKINS No. 53 REGULAR OR SHIP PATTERN

A most popular Atkins saw, No. 53, Silver Steel blade, Damaskeen finish, handle of Applewood, Perfection Pattern, embossed. Each work bench should have a No. 53.

ATKINS No. 3 NEST OF SAWS

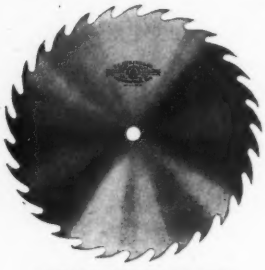
Atkins No. 3 Nest of Saws is very popular in schools where high grade tools are appreciated. 12 inch keyhole blade, 14 inch Compass blade, 18 inch Metal Cutting blade, with interchangeable handle.

ATKINS No. 1 MITRE SAW

The fine quality of Atkins Silver Steel is also found in our Mitre Saws. 4 inches to 6 inches under back to tooth edge and in lengths of 18 inches to 32 inches. Genuine Applewood handle.

Ask for Atkins Text Book—tells how to care for and use Hand, Rip and Panel Saws.

Atkins Silver Steel Narrow Band Saws are recommended for better and accurate work. Made in widths of ⅛ to 1¾ inches. Try a pair.



ATKINS SOLID TOOTH CIRCULAR SAWS

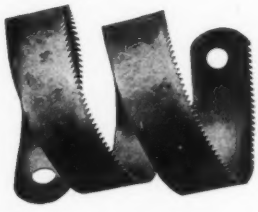
For your circular saw table Atkins Silver Steel Circular Saws cannot be beat. The results from using Atkins will prove absolutely that they are "The Finest On Earth."

ATKINS GRINDING WHEELS

Acrolite Grinding Wheels for saws, knives and tools. Ferrolite Grinding Wheels for brass, copper, chilled iron, etc. Send for our Grinding Wheel book.

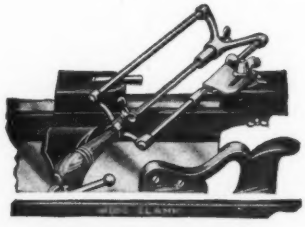
ATKINS BLUE STAR KNIVES

Atkins Blue Star High Speed Steel Knives; the latest development in high grade machine knives. They have no equal for wearing and cutting qualities.



ATKINS NON-BREAKABLE BLADE

To those who have suffered a heavy loss on account of breakage the Atkins Non-Breakable Hack Saw Blade will prove extremely profitable.



ATKINS HAND-SAW FILER

Every school should have at least one Atkins Hand Saw Filer. Easily operated by the youngest mechanic.

Send for "Saws in the Shop," a book on metal cutting containing useful hints for the school workshop.

ATKINS ALWAYS AHEAD

May we send Atkins' complete New Saw Sense Book descriptive of "A PERFECT SAW FOR EVERY PURPOSE"?

FINEST ON EARTH

E. C. ATKINS & COMPANY

Established 1857

The Silver Steel Saw People

Machine Knife Factory: Lancaster, N. Y.

Home Office and Factory: INDIANAPOLIS, IND.

Canadian Factory: Hamilton, Ont.

Atlanta
New York
New Orleans

Minneapolis
Seattle
San Francisco

Portland
Memphis
Chicago

Vancouver, B. C.
Paris, France

THE INDUSTRIAL ARTS MAGAZINE

Volume XVI NOVEMBER, 1927 No. 11

THE INSTITUTE OF TECHNOLOGY (TEKNOLOGISK INSTITUT) IN COPENHAGEN

Herman Hjorth, Saunders Trade School, Yonkers, N. Y.

THE INSTITUTE OF TECHNOLOGY is the most advanced trade school in Denmark, if not in the world. It is in reality the university of the craftsman, and a post-graduate one at that, because most of its courses are open to journeymen and master craftsmen.

History

Although the institute is comparatively young, it has had a remarkable growth during the few years of its existence, thereby demonstrating most effectively its usefulness in the educational scheme of Denmark.

It was in the beginning of this century that progressive men from the industrial world called attention to the necessity of employing new methods of construction and utilization of the new discoveries in the field of electricity and the modern inventions in machinery. This revolution in methods of work meant, to a large extent, the reeducation of men who had learned their trades in the old way. To accomplish this end, short, intensive courses which would give the craftsman information about new types of machinery and motors, and instruct them in their practical application, were inaugurated.

THE INSTITUTE OF TECHNOLOGY IN COPENHAGEN, DENMARK.

These men were to be given also some knowledge of chemistry so that they would begin to appreciate those chemical compounds which they used in their everyday practice. Finally, in 1904, a plan was formulated for the purpose of encouraging the technical development of Danish craftsmanship and industry through the establishment of a bureau of consultation, and chemical-technical and mechanical-technical laboratories.

In 1906 this plan took concrete form, and two trial courses for woodworkers and metal workers were offered. Besides practical shopwork, the plan of instruction included bookkeeping, chemistry, and information about materials and motors. These courses, attended by 48 students, were four weeks in length with from seven to eight hours' work daily.

Stimulated by the success of this modest beginning, the institute grew rapidly in size and importance. In 1907 it obtained government aid, and in 1918 it was able to move from its rented quarters into its present beautiful and up-to-date building, which is well equipped with shops, laboratories, and recitation rooms.

The Work of the Institute

The work of the institute is rather extensive and is divided into several departments, of which the following are the most important: The day school, the evening school, extension work, consultations and experiments, lectures, library service, and exhibits.

The Day School

The work of the day school consists mainly of short-unit courses for journeymen and masters. A feature of most of these courses is one or two visits to representative industries. To give an idea of the wide range of the work, the courses given during the school year 1925-26 are listed below:

Courses	Subjects	Length of Time
4	Machine-shop practice	
1	Tailoring	3 weeks
1	Motors and storage batteries	6 days
1	For firemen (steam and hot-water systems)	10 days
2	Shop machinery for engineering students	1 month each
2	Auto mechanics	2 weeks each
1	Auto mechanics	4 weeks each
2	Oxyacetylene welding	1 week each
1	Plumbing	5 weeks
1	For unemployed cabinetmakers	7 lectures
1	For butchers	3 weeks
1	For coach builders	4 weeks
3	For blacksmiths	4½ weeks
3	In motor operation (electric, Diesel, gasoline) for railroad engineers	2 weeks each
1	In auto-body building	2 weeks
1	In building construction	3 weeks
1	In cabinetmaking	8 weeks
2	In operation of woodworking machinery	4 weeks each
2	In auto mechanics for unemployed chauffeurs	1 week each
1	In terrazzo work	1 week
1	In upholstering	3 weeks
1	In steam fitting	1 month
1	Heating for gardeners	4 days
1	Silversmithing	4 weeks
1	In road building	2 weeks

There were given also several courses in the care and operation of agricultural machinery for farmers and students at agricultural schools.

All these courses are offered because of an immediate need, hence they vary from year to year. Close cooperation with trade organizations is always maintained. As a matter of fact, some of these courses were held at the request of such organizations. Thus, the locomotive engineers asked for a course in motor operation, because motor trains are coming more and more into use in Denmark and will probably replace the steam locomotives to a large extent. During 1925-26, 1447 students attended these day courses.

The Evening School

The courses in the evening school were even more numerous and diversified in character than those given in the day school. The evening school has two main divisions: The cultural and commercial, and the technical. The following courses were given in the first division: Danish, penmanship, arithmetic, bookkeeping, German, English and French. A total of 82 courses were given in the technical division. The

CHEMICAL LABORATORY, INSTITUTE OF TECHNOLOGY, COPENHAGEN, DENMARK.

BLACKSMITH SHOP, INSTITUTE OF TECHNOLOGY, COPENHAGEN, DENMARK.

majority of them were on subjects, similar to those given in the day school. The following are a few of the special courses that were given in the technical evening division:

Technical English given for the purpose of enabling the student to read technical literature.
Surveying for landscape gardeners.
Drawing for landscape gardeners.
Curtain hanging for painters and decorators.
Furnace operation for owners of private houses.
Auto mechanics for owners of private automobiles.
Ladies' hairdressing for barbers.
Electric and gasoline motors and agricultural machinery for soldiers.
Hard-candy making.
Operation of shoe machinery for factory workers.

The evening courses were attended by 2507 students during the year 1925-26.

Extension Courses

A very interesting and useful part of the work of the institute is the extension work, the object of which is to give skilled workers in other parts of the country the same opportunity to obtain instruction in certain specialties of their trade as is given their fellows at Copenhagen. The courses invariably are given in cooperation with the local trade organization, which undertakes the necessary publicity work in order to secure a good attendance at the courses. The hours for these courses are so arranged that those who attend will be able to spend a few hours at their own shop or business each day.

Twenty-seven of these courses were given last year and 519 students took advantage of them. The average number of hours per student was thirty. In one city, thirteen wives of artisans attended a course in bookkeeping.

Consultations and Experiments

This is one of the most important and indispensable phases of the work of the institute. Most of the inquiries can be taken care of by mail, but it often is necessary for some member of the faculty to travel to the place from which the inquiry is sent, in order to show how a special piece of work may be done in the best and most economical manner. It is evident that the institute cannot always send a member of its faculty immediately, but such visits can usually be arranged within a few days or weeks at the most. An inquiry is then sent to the trade organization in that part of the country for the purpose of learning if other members in the vicinity from which the inquiry came, wish to profit by the visit of the institute's expert. As the institute receives government aid for this purpose, only a nominal fee is charged for these consultations.

The work, which is most varied and interesting is divided into the following departments:

Electric motors	Bookkeeping
Gasoline and Diesel motors	Painting
Chemistry	Tailoring
Machinery	Building construction
Cabinetmaking	Heat installation
Weaving	Gardening
Baking	Other industries

The number of consultations during the past year have amounted to more than 4,000. They have been on such subjects as labor-saving methods, construction of special tools, purchase of machinery, new types of construction, trouble finding, chemical analyses, experiments with different materials, etc.

The institute frequently is called upon to render expert advice also in law cases.

Lectures

The institute holds a large number of lectures every year. Among those of the first category held last year, the lectures for skilled workers without employment especially deserve to be mentioned. These were given at the request of the Workers Educational Society to cabinetmakers, machinists, molders, painters, electricians, and workers in chemical industries. The lectures were given gratuitously by members of the faculty.

Other lectures were on such subjects as bee culture, grinding, how to fill out income-tax returns, and other subjects of general interest.

As a part of the institute's plan of instruction, a number of lectures of a general cultural nature were given for the benefit of its regular students. These lectures generally were

followed by some selections of classical music, either vocal or instrumental, executed by well-known artists.

The Library

The institute, in the course of time, has secured a fine collection of technical books, partly through purchases and partly through donations. Besides the Danish publications, the institute subscribes to a number of technical journals from America, France, England, and Germany.

The library, which is used only as a reading room, is steadily gaining in popularity among skilled workers. In order to make it still more popular, a series of Saturday-night lectures, accompanied by lantern slides, are given by members of the faculty every year. Books dealing with the subject of the lecture are displayed and discussed informally after the lecture.

Exhibits

The institute does a valuable piece of educational work through its exhibits. A special hall is provided for the many technical exhibits that are held every year. The hall is rented to other exhibitors when not being used by the institute. A radio exhibit, a Froebel exhibit, a dairy exhibit, and a Greenland exhibit were among the many held during the past year. One of the most interesting exhibits is the one held yearly at Christmas at which only Danish products are exhibited. Its object is to protect Danish industry through the purchase of Christmas gifts manufactured in that country. Last year 40,000 people, including the king and members of the royal family, visited this exhibit. The institute holds or assists also in exhibits held in other parts of the country for the benefit of those who cannot visit the capital.

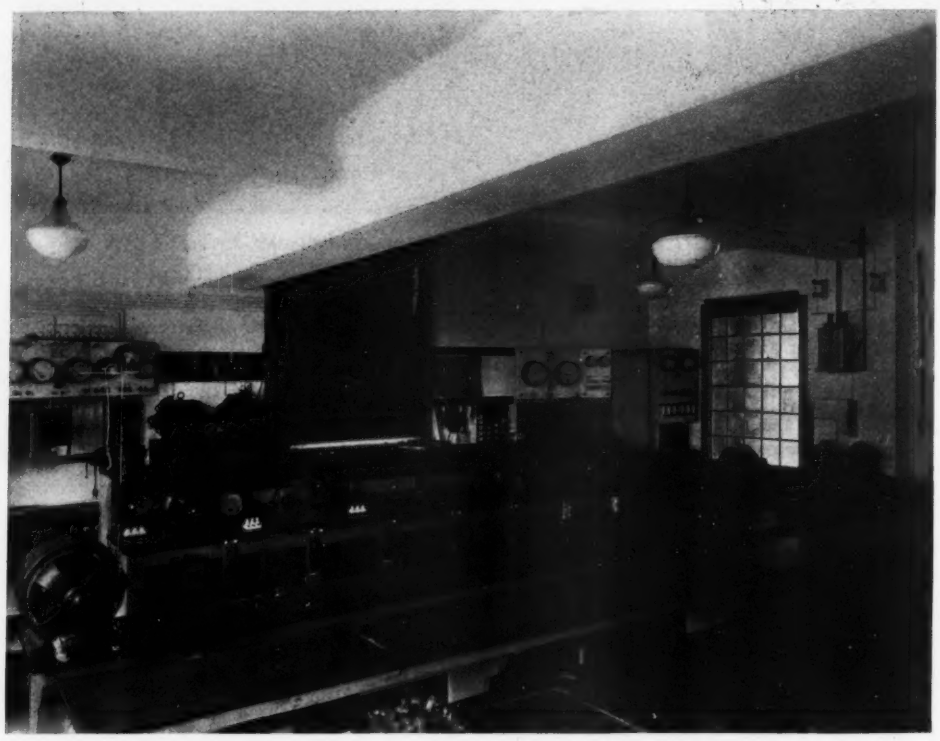
The Organization of the Institute

The institute like other technical schools in Denmark was built, and is owned, and operated by industrial associations, and like other schools has had to prove its worth before government aid could be obtained.

It is governed by a board of trustees of 26 members including the director, who is a member ex officio. The director, Mr. Gunnar Gregersen, C.E., is in immediate charge. He has been at the head of the institute since it started nineteen years ago and deserves unstinted praise and credit for the splendid way in which he has developed it.

The members of the board of trustees are elected according to law as follows: Five by the department of commerce, one by the municipality of Copenhagen, six by the association for Danish industry and craftsmanship, six by the industrial association of Copenhagen, three by the association for skilled workers, and three by the united trades unions.

The budget of the institute during the past year amounted to 1,076,283.13 Kroner. Of this amount, 422,-113.02 Kroner was contributed either by the government, the municipality, or by various trades organizations. The remainder was derived from tuition fees, fees for consultations, and exhibits. It is interesting to note that this institution already has outgrown its present quarters, and that a considerable addition to the building is to be constructed next year.



ELECTRICAL LABORATORY, INSTITUTE OF TECHNOLOGY, COPENHAGEN, DENMARK.

Summary

The Institute of Technology in Copenhagen is the most advanced trade school in Denmark. As a rule only journeymen and master craftsmen are admitted to its courses.

From a very modest beginning in 1907, it is now a most important and indispensable institution; in reality a university for the craftsman.

The work of the institute is divided into the following departments: The day school, which gives short, intensive courses in some part of a trade; the evening school, which does its work much in the same way; the extension work, which consists of short courses with a similar content as those of the day school, but which are given in other parts of the country; the consultation and experiment work, which is carried on at the institute and through personal visits by

members of the faculty; the lecture work, which includes both cultural and technical subjects; the library work, which includes also lectures; and the exhibits which are given at the institute and in various parts of the country for the benefit of those who cannot visit the capital.

It is the policy of the institute to carry on all its work in the closest cooperation with industrial organizations.

The institute is owned, built, and governed by industrial organizations. Its immediate direction is in the hands of a board of trustees of 25 members and a director. The institute is only partly self-supporting, and receives considerable aid from the government, the municipality, and from other sources.

THE EVENING-SCHOOL PROGRAM—ITS PROMOTION AND MAINTENANCE

Glen D. Brown

SINCE LONG BEFORE THE TIME of Ichabod Crane's singing school, supposed to have been conducted for the mutual benefit of the lads and lassies of Tarry Hollow, private individuals, or groups of individuals, have successfully or unsuccessfully attempted to give aid to adults in the acquisition of general and special knowledge and in the development of manual skill during their leisure hours in the evening, when the routine of their daily tasks was temporarily ended.

It was not until within the past decade, however, that the evening school became quite generally established as a definite, recognized phase of our public-school system. Notwithstanding the fact that in altogether too many instances evening schools have not functioned effectively, educational administrators have been quick to take advantage of the unusual chance the evening school offers to sell to the public the idea of continued education.

It is not necessary to take time to review the development of the evening school from the time when only a small group of school superintendents existed, who believed that education was not wholly for the purpose of "disciplining the mind," until now when an ever-increasing number of school executives believe in fitting the schools to the people and not the people to the schools. If we accept the idea that education is a social process continuous from childhood to old age, then the evening school, diversified in accordance with the community's educational needs, and effectively conducted, provides perhaps the biggest opportunity for making education such a continuous process.

An evening instructor in salesmanship once based a series of talks on these three premises of selling: 1. Organize; 2. Sell yourself; 3. Sell your merchandise. The first step then is to organize, and organization should center around a survey of the entire local situation as to specific, well-defined needs for adult training, and as to facilities available to most adequately provide for such needed training. The fact that one city finds need for classes mostly in trades and industry, commercial subjects, and homemaking, would not necessarily be a basis for offering such classes in an agricultural community, or in a city with a large foreign-born element.

When the courses to be offered have been determined, then come such matters as the time and place of class meetings, length of courses, preparing of budgets, selecting teachers, determining salaries, organization of subject matter, classifying students, preparing forms for records and reports, and other necessary matters. A well-chosen advisory committee of representative men and women of the community, guided into functioning effectively, can be a tremendously valuable factor in conducting an evening school.

Too little significance, in a great many instances at least, has been attached to the idea of the vocational director "selling himself." Particularly is this true in regard to his duties of directing the evening school. He must, of course, have previously "sold" himself to the school trustees, to his superintendent, and to the school faculty, by definitely establishing successful vocational day classes. He must not look upon the evening school, as is done only too often, as just an added "burden." It is true, the opening of evening school comes at a period of the year when time is most limited, and if the head of the evening school is not thoroughly willing and capable the type of evening school organized will unquestionably have no license to exist as an educational agency worth its cost.

After organizing effectively and getting a running start, at least, in *selling himself*, the evening-school head must complete the *process* by permanently *selling his merchandise* to the adult population of his community. It is perfectly legitimate to include in the vocational budget an appropriate amount to be used for advertising. This should be supplemented by divers means of securing free advertising. Following are a few suggestions of methods of selling the evening school to the public which have proved successful: Paid advertisements, well planned; movie slides; handbills; window placards; letters to former students, and prospective students; factory talks to special groups; personal solicitation by teachers; street-car posters; electric signs; announcements of courses in circulars distributed to industries, homes, and so on; verbal announcements from pulpits; civic-club demonstrations and talks; well-directed news items; editorial comments; conducting special classes in business houses and industrial plants where visible results of work can be noted by others; requiring instructors to do follow-up work; holding public evening-school convocations; standardizing courses, and giving certificates that carry value; encouraging visitations; holding exhibits of students' work; keeping employer informed of students' progress; checking attendance with both student and employer; paying attractive salaries which secure real, live, well-qualified instructors; charging fees which encourage good attendance and secure the ambitious and interested type of students; offering courses suitable to community needs. These and many other devices constitute the secret of a successfully promoted evening school, permanently sold to the general public.

The copies of forms included in this article, were used in the past in promoting and maintaining evening-school work. They are not particularly original. Some of them are to be discarded, and most of them need revision; yet collectively, they have been the instruments by which material aid has been rendered in effecting a reasonably well-organized and well-conducted evening school, if enrollments, averages of attendance, completed courses, aid in individual promotions and securing of positions, demands for additional courses, and press comments, are any criterion by which to judge. The advertising matter used in the publicity program may not be considered novel, original, or particularly well planned, but the results obtained proved that these methods form a workable basis for selling an evening school to the community.

FREE PUBLIC
EVENING SCHOOLS

Conducted by the

DIVISION OF VOCATIONAL EDUCATION

Muncie Public Schools
1926-1927

Enroll at the building where your course is offered
7:00 to 9:00 P. M.
Monday Evening, Jan. 10, 1927

Your Chance to Advance

FRONT PAGE.

Evening-School Courses are open to anyone over sixteen years of age, not enrolled in the day school.

New courses in any well-organized trade or profession may be formed upon request from a sufficient number of applicants.

All night-school courses require a fee of $1.00 as a pledge of good faith. This will be refunded at the end of the semester if student's average attendance is 75 per cent or more.

Commercial courses require a fee of $4.00, which is not returnable to students.

For further information about evening-school courses, call at Room 139 Central High School Building, or telephone

THE DIVISION OF VOCATIONAL EDUCATION
Phones 24 or 5100
FRANK E. ALLEN, Supt. of Schools
GLEN D. BROWN, Director of Vocational Education

BACK PAGE.

TRADE AND INDUSTRY COURSES
H. F. Brickley, Associate Director Vocational Education
Phone 24
CENTRAL HIGH SCHOOL BUILDING

APPLIED ELECTRICITY
Tues., Thurs.—Mr. Blackwood and Mr. Woolley ..... Room 146

CABINETWORK
Tues., Thurs.—Elementary—Mr. Wellinger ..... Room 135
Mon., Wed.—Advanced—Mr. Riekeberg and Mr. Main ..... Room 135

DRAFTING
Mon., Wed.—Mr. Macy and Mr. Brickley ..... Room 148

MACHINE SHOP
Tues., Thurs.—Elementary—Mr. Davis ..... Room 132
Mon., Wed.—Advanced—Mr. Peacock ..... Room 132

PRACTICAL CHEMISTRY
Mon., Wed.—Mr. Zetterberg ..... Room 311

SHOP MATHEMATICS
Mon., Wed.—Mr. Pittenger ..... Room 211

COMMERCIAL COURSES
W. B. Minnich, Head of Commercial Dept. Phone 5100
CENTRAL HIGH SCHOOL BUILDING

Mon., Wed.—Mr. Tuhey and Mr. Jackson ..... Room 403

ADVANCED BOOKKEEPING
Mon., Wed.—Mr. Tuhey ..... Room 403

BUSINESS LAW
Mon., Wed.—Mr. Myers ..... Room 224

PUBLIC SPEAKING
Tues., Thurs.—Mr. Myers ..... Room 224

ADVERTISING
Mon., Wed.—Mr. Minnich ..... Room 302

STENOGRAPHY AND TYPING
Mon., Wed.—Miss Siegwart and Miss Sharp ..... Room 401

BUSINESS ENGLISH
Mon., Wed.—Miss Edwards ..... Room 328

ADV. DICTATION
Mon., Wed.—Mr. Clevenger ..... Room 304

HOMEMAKING COURSES
Mrs. O. B. Christy, Supervisor. Phone 5100
CENTRAL HIGH SCHOOL BUILDING

PLANNING AND SERVING MEALS
Tues., Thurs., Supper-Hour Class, 5:30-7:30—Miss Johnson .. Room 108

MILLINERY
Mon., Wed., 3:00 to 5:00—Miss Horn ..... Room 101
Tues., Thurs., 7:00 to 9:00—Miss Curry ..... Room 113

DRESSMAKING
Tues., Thurs., 7:00 to 9:00—Miss Webb ..... Room 102
Mon., Wed., 7:00 to 9:00—Mrs. Hottinger ..... Room 102

NUTRITION AND CHILD CARE
Mon., Wed., 7:00 to 9:00.

HOME FURNISHING
Tues., Thurs., 7:00 to 9:00—Mrs. Potter ..... Cafeteria

GARFIELD BUILDING

DRESSMAKING
Tues., Thurs., 7:00 to 9:00—Mrs. Hottinger.

MILLINERY
Mon., Wed., 7:00 to 9:00—Miss Curry.

NUTRITION AND CHILD CARE
Fri., 2:30 to 4:30—Mrs. Cecil.

ROOSEVELT BUILDING

PLANNING AND SERVING MEALS
Tues., Thurs., 7:00 to 9:00—Mrs. Cecil.

LINCOLN BUILDING

DRESSMAKING
Tues., Thurs., 3:00 to 5:30—Mrs. Hines.

LONGFELLOW BUILDING

PLANNING AND SERVING MEALS
Tues., Thurs., 7:00 to 9:00—Mrs. Coughill.

DRESSMAKING
Mon., Wed., 7:00 to 9:00—Mrs. Hines.

INSIDE PAGES.

Advertising pamphlet distributed into every home and through the factories. The pamphlet consists of four, 4 by 7 in. pages.

Dear Friend:—

The second semester of evening school begins next Monday, January 10.

As a former evening-school student we trust that you were benefited in some degree, and extend an invitation for you to enroll again in any course meeting your needs.

Have you a friend who needs the help of the evening school? The success of the evening school depends upon its ability to reach those who need the help of the school and are ambitious enough to use their time and energy for their self-improvement. A little encouragement from you may be all that is needed to start some friend or acquaintance on the road to a bigger and better future made possible by the evening schools. Your cooperation in telling your friends about the evening-school courses will be appreciated, for it is our desire to reach and help as many as possible.

Courses will be offered similar to those of the first term, and in addition a new class will be formed in Advanced Bookkeeping.

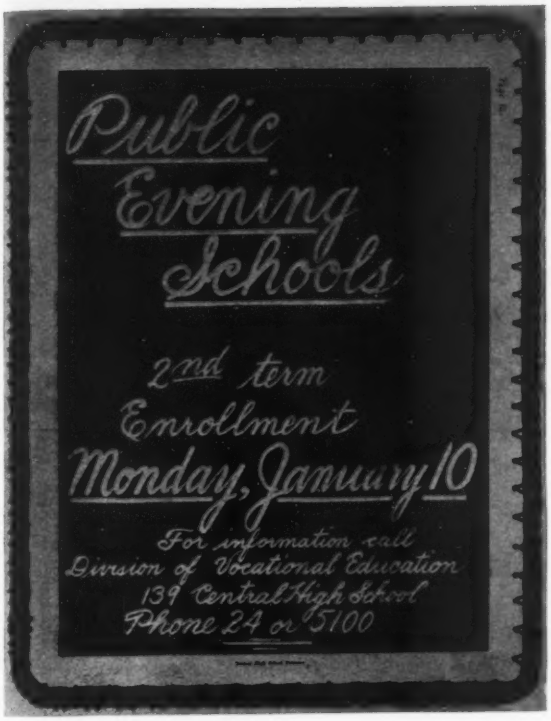
Since it has often been necessary to limit the enrollment in certain classes, it is important that those desiring to enroll be there on the opening night.

Sincerely yours,

GLEN D. BROWN,
Vocational Director.

P. S.—Watch the papers for announcements and remember the date —January 10.

Form of notification to previous students concerning opening of new term of night school. This notification is in the form of a multigraph or mimeograph letter.



Form of Window Placard. This card measures 11 by 14 in.

OFFICE OF DIRECTOR OF VOCATIONAL EDUCATION
MUNCIE CITY SCHOOLS
139 Central High School Building

Muncie, Indiana, ...192..

.....

You have been selected to teach.... .....
in the Night Schools, ... Building.
Your salary will be $..... per evening recitation of two hours' duration for the.....term, school year 192..-192...
This assignment is made subject to whatever changes may be necessary because of changes in enrollment, which necessitate division or discontinuance of a class, or failure to secure required number for a class.
This assignment is subject to cancellation for incompetency, failure to keep records properly, or to make required reports accurately, when due.
Proper license must be on file in the Vocational office before any payment of salary can be allowed. (This does not include regular day-school Vocational instructors whose licenses are already filed in the school office.)
Regular day-school instructors will not be permitted to teach more than two evenings per week.

By Order of Board of Education,
Frank E. Allen, Superintendent.
Glen D. Brown, Vocational Director.
H. F. Brickley, Associate Director.

I accept the position indicated above subject to the terms of this notice.

.....Teacher.
Permanent Address.....
Phone Number.....

Teacher's Agreement. This form measures 5½ by 8½ in. It is arranged in duplicate form. The original is white; the duplicate pink.

$1.00 No.....
Division of Vocational Education
MUNCIE CITY SCHOOLS
Received of.....
ONE DOLLAR
For Evening School attendance pledge. To be refunded at the end of term if average attendance is 75 per cent or more.

.....
Director of Vocational Education.

Receipt to pupil for pledge of attendance. The receipt measures 3 by 5 in. It is arranged in duplicate form. The original is white; the duplicate pink.

....
Name in full (surname first) Course Building

REGISTRATION CARD
NIGHT SCHOOL
Division of Vocational Education
Muncie Public Schools

Pledge paid.....
Receipt No.....
Pledge returned.....
Date.....192..
Street Address.....Age.....Phone.....
Trade or Profession.....Years in Trade.....
Employed at.....
Give name and position of person to whom you are directly responsible where you are employed.....
GLEN D. BROWN, ...
Director of Vocational Education Countersigned by Instructor
I hereby agree to attend classes regularly and to complete all required work.

.....
The information on this card is for the State Department of Public Instruction and all questions must be answered accurately.

Registration card which is filled out by the student on enrollment night. This card measures 5 by 8 in.

(Front)

....
Name in full (surname first) Course Building

STUDENT RECORD CARD
NIGHT SCHOOL
Division of Vocational Education
Muncie Public Schools

Date... .....192..
Street Address.....Age.....Phone.....
Trade or Profession.....Years in Trade.....
Employed at.....
Give name and position of person to whom you are directly responsible where you are employed.....
GLEN D. BROWN, ...
Director of Vocational Education. Countersigned by Instructor.
I hereby agree to attend classes regularly and to complete all required work.

.....
The information on this card is for the State Department of Public Instruction and all questions must be answered accurately.

(Back)

Fee Paid.....
Name..... Fee Returned.....

Attendance	1	2	3	4	5	6	7	8	9	10	11	12
	13	14	15	16	17	18	19	20	21	22	23	24

Per cent Attendance.....
No. Nights Present.....
EXPLANATION—Denote absence by X through number of session: the fourth consecutive absence should be marked W (withdrawn). Denote reentered student by R. Students entering after first night, mark E.
Record in this space the student's progress by units, projects or assignments completed
Check grade of work done— Excellent Average Poor
Recommended—Not Recommended for Certificate.
.....Instructor.
NOTE: 80 per cent attendance and satisfactory completion of work qualifies for Certificate. Exceptions may be made with Director's approval.

Student's record card for the teacher's class record and permanent office record. This card measures 5 by 8 in.

ADMIT

M .....
Address .....
To vocational night-school class in.....
Mr. .....Instructor
Room No.....Building
Date..... .....
Signed.

Admission card for students who enter after the regular enrollment night. This is a 3 by 5-in. card.

Gentlemen:

We are very pleased to inform that M..... who is employed by your firm, has enrolled in our Night Schools for a course in.....

The Muncie Night Schools are conducted principally for the benefit of employed citizens over sixteen years of age who have little opportunity to receive further education except during leisure time in the evening. Insofar as possible personal attention is given to each student, and every effort is put forth to give specific training along lines which will be of material aid to him in his daily occupation, thereby not only benefiting himself, but also his employer.

Inasmuch as a night-school term of twenty recitations is a very short period in which to present a course, and get effective results, may we ask that you cooperate with us by urging upon your employee the necessity for regularity in attendance?

We solicit any suggestions you may have to offer which would aid us in conducting our Night Schools, and cordially invite you to visit our classes at any time.

Very truly yours,
GLEN D. BROWN,
Director Vocational Education.

Notification to firm of employee's enrollment. This notification is in the form of a multigraph or mimeograph letter.

Daily Report of Vocational Night-Class Attendance

Course..... Building.....
Teacher in Charge..... Date .....

Names	Names
ABSENT (Space for 17 names)	WITHDRAWN (Space for 6 names)
	REENTERED (Space for 4 names)
	ENTERED (Space for 7 names)

Attendance record blank. This blank measures 7 by 8½ in.

Muncie, Indiana.

Dear Friend:

Our office records show that you were absent from your evening class the last two meetings. Your enrollment was an indication of your desire to progress, but in order for you to secure the greatest benefit, regularity in attendance is essential.

We trust that if possible you will be present at the next class.

Very truly,
GLEN D. BROWN,
Director Vocational Education.

One dollar pledge returnable upon 75 per cent average attendance.

80 per cent average attendance necessary for securing a certificate.

Follow up on attendance No. 1. This is printed on a standard post card.

Dear Friend:

According to our records you have been absent from your evening class in.....for four consecutive recitations. This automatically lists you as a withdrawn student, unless some reasonable excuse is given, such as sickness or other unavoidable circumstances. May we remind you again that an attendance of 80 per cent of the nights taught is necessary before a certificate may be granted?

May we call your attention also to the fact that a night-school term of twenty recitations is a very short period in which to present a course, and get effective results, unless the student is regular in attendance and interested in the work?

The Muncie Night Schools are conducted principally for the benefit of citizens over sixteen years of age who have little opportunity to receive further education except during leisure time in the evening.

We want you to feel that we are personally interested in you, and desire that you reenter your class.

If your absence is temporarily due to unavoidable circumstances please inform us so that you will not be permanently withdrawn. In any event please be assured that you are welcome to reenter to complete this course or to pursue other courses in the Muncie Night Schools.

We appreciate your interest and will be glad to have you tell others of the opportunity we are endeavoring to offer the general public, to further their education.

Very truly yours,
GLEN D. BROWN,
Director Vocational Education.

Follow up on attendance No. 2. This is in the form of a multigraph or mimeograph letter.

Gentlemen:

We are very sorry that your employee, M....., who enrolled in our Night Schools for a course in....., has withdrawn.

We are earnestly trying to give instruction in our Night Schools that will be of material benefit not only to the student personally, but also to the employer. Students who have voluntarily withdrawn from one of our night courses may reenter at any time, and since our terms are short it is expedient that they reenter without delay, so that there will be a continuity in the work they have started.

May we ask that you cooperate with us by urging that M..... .....return to his class? If he cannot reenroll, or does not care to do so we would appreciate very much to be informed as to the reason, so that we may do our part in making our courses more beneficial to all parties concerned.

Very truly yours,
GLEN D. BROWN,
Director Vocational Education.

Notification to employer that employee has withdrawn from night school. This is in the form of a multigraph or mimeograph letter.

Gentlemen:

We are very glad to inform you that M....., who withdrew from our night-school course in....., has reenrolled to complete the course. We are always glad to have our students who have voluntarily withdrawn return to their classes, and are very appreciative of any cooperation given us by their employers in influencing them to reenter our night schools.

We trust that both your firm as well as your employee will be materially benefited by this course.

Very truly yours,
GLEN D. BROWN,
Director Vocational Education.

Notification to employer that employee has reenrolled in night school. This is in the form of a multigraph or mimeograph letter.

NIGHT SCHOOL
PERCENT OF ATTENDENCE

Att.	Number of Class Sessions Held									
	24	23	22	21	20	19	18	17	16	15
1	.041	.043	.045	.047	.050	.052	.055	.058	.062	066
2	.083	086	.090	.095	.100	.105	.111	.117	.125	.133
3	.125	.130	.136	.142	.150	.157	.166	.176	.187	.200
4	.166	.173	.181	.190	.200	.210	.222	.235	.250	.266
5	.208	.217	.227	.238	.250	.263	.277	.294	.312	.333
6	.250	.260	.272	.285	.300	.315	.333	.352	.375	.400
7	.291	.304	.318	.333	.350	.368	.388	.411	.437	.466
8	.333	.347	.363	.380	.400	421	.444	.470	500	.533
9	.375	.391	.409	.428	.450	.473	.500	529	.562	.600
10	.416	.434	.454	.476	.500	.526	.555	.588	.625	.666
11	.458	.478	.500	.523	.550	.578	.611	.647	.687	.733
12	.500	.521	.545	.571	.600	.631	.666	.705	.750	.800
13	.541	.565	.590	.619	.650	.684	.722	.764	.812	.866
14	.583	.608	.636	.666	.700	.736	.777	.823	.875	.933
15	.625	.652	.681	.714	.750	.789	.833	.882	.937	1000
16	.666	.695	.727	.761	.800	.842	.888	.941	1.000	
17	.708	.739	.772	.809	.850	.894	.944	1.000		
18	.750	.782	.818	.857	.900	.947	1.000			
19	.791	.826	.863	.904	.950	1.000				
20	.833	.869	.909	.952	1.000					
21	.875	.913	.954	1.000						
22	.916	.956	1.000							
23	.958	1,000								
24	1.000									

CALCULATION TABLE FOR COMPUTING PERCENTAGE OF ATTENDANCE.

NIGHT STUDENT RECORD

Name,

Address,

COURSE	TERM	ATTEND.	CERT.	DATE

STUDENT RECORD FORM.

Muncie Public Schools
Muncie, Indiana
Evening School Certificate

THIS CERTIFIES THAT

has completed the course of study in

as prescribed by the Department of the Evening Schools and is entitled to this certificate of recognition

492 _____ Superintendent
_____ Evening School Director
_____ Instructor

EVENING SCHOOL CERTIFICATE.

The financial program behind the promotion and maintenance of an evening-school program is of course most essential. In Muncie the solution has been a local tax levy which has varied from three to four cents in accordance with current needs from year to year. Unredeemed one-dollar attendance pledges have provided some funds, and a four-dollar-per-term fee required from night commercial students practically maintains that phase of the work.

In Muncie the night school has very decisively proved itself to be one of the greatest constructive agencies in providing the adult population with the means by which profitable use has been made of leisure time. Subjects offered have been based upon a survey as to existing needs. Described generally,

these courses have been trade and industrial, commercial, and homemaking. General courses also have been provided as funds permitted.

It may be said that while it is generally true that not a great deal has been done in the development of evening schools which really function to the extent that community needs are met, it is also quite true that evening schools as promoted and maintained in many localities are imparting as much additional knowledge and they are providing as many trained hands, as any of the other educational agencies in the country.

If persons responsible for the education of our people will get the true vision of the purpose of education, the enormous financial outlay for physical equipment, primarily provided for the training of our youth, will also be used for the youth who must labor, and for the adult of any age whose full-time school days are past.

ISSUING A DEPARTMENT BULLETIN

Arthur Feuerstein, Director of Industrial Arts, Rogers School, Stamford, Conn.

THE WORK OF THE INDUSTRIAL-ARTS Department is so different from the work of the other departments of the school that it often can borrow, and use, methods that prevail in the industrial and commercial world. Industrial organizations recognize, for instance, that if a spirit of harmony and good will prevails among employees, work is done more efficiently. The same is true at school. The atmosphere in a shop where the teacher and pupils pull together and where the pupils are friendly toward each other, is quite different from that in a shop where the spirit is a sort of passive acceptance. A weekly bulletin, corresponding to bulletins issued by various industrial organizations, will do much to raise the morale of the industrial-arts department and at the same time serve other purposes as well. The writer has been issuing a bulletin regularly for over a year and is satisfied that the results justify its continuance.

The Bulletin

An industrial-arts bulletin serves several important needs.

1. *It unites the boys of the department.* The department broken up into classes, as it is, really requires some means of breaking down this division so that the shop may function as a unified department instead of as a number of individual classes.

2. *It stimulates a desire to do better work.* By mentioning the accomplishments and special achievements of the boys in the bulletin at various times, a spirit of competition is aroused that extends outside of the immediate class. To encourage a desire to do better work is by far superior to requiring it. The results may not be as immediate but will prove more permanent. Recognition in a bulletin that has a circulation throughout the school and beyond, has a good deal of the appeal that recognition in a newspaper has to the average person.

3. *It is a means of acquainting the school with the work of the department.* The need for this is obvious and too often the instructor takes for granted that the work of his department is understood by the principal and other teachers. A bulletin helps to create this understanding in a concrete way and if issued regularly, the bulletin serves to give a good cross-sectional view of the shop activities.

4. *It is a means of instruction.* This will be apparent after the contents of the bulletin have been explained further on.

5. *It is also a means of publicity.* If sufficient copies are made so that they may be given out to those outside of the school who are interested in industrial-arts work, it is a form of publicity that carries more weight than a newspaper article. As it is a bulletin used for instruction purposes, it is really a sample of one method used in the teaching of the subject.

Making Up the Bulletin

The way in which you make the bulletin will depend largely upon the facilities at your disposal. There must be some means of manifolding the matter; and of the various manifolding processes, mimeographing will probably serve the purpose best. By this method both the editorial matter and drawings may be reproduced economically and rapidly. The method of reproduction used will somewhat determine the size and form of the bulletin. The writer has been using a one-page bulletin on the large-size mimeograph paper, 8½ by 14 in.

If you have never issued a bulletin regularly, some difficulty may be experienced in collecting the information and writing the articles, but this difficulty can be lessened considerably if the instructor makes notes when occasions arise during the work of the classes.

It is well to keep the bulletin in a definite form so that the pupils will get to understand what information may be found in the bulletin. As an example, let us analyze a typical bulletin as issued regularly by the writer.

1. *Heading.* An attractively drawn heading adds much to the force of the bulletin, and besides having a psychological effect on the pupils, it serves as a means of identification. If the design of the heading is different each week, it is that much more interesting and effective in calling attention to the latest bulletin.

2. *Editorial.* The first article each week is an editorial touching on some phase of life that is closely related to the current atmosphere of the shop. A caution seems advisable here; avoid making the articles merely sermons and keep them within the grasp of the boy. The editorial of the bulletin is best explained by the following examples:

TO PLAY HARD AND WORK HARD MEANS SUCCESS

Once in a while it happens that your instructor has to break up an argument as to who is the best batter on your team or who is the better second baseman. What would you say to a boy who got into an argument about industrial arts while he was playing second base? You would probably tell him to stop arguing and play ball or get off the team.

Is it not just as right for your instructor to tell you to get to work or get out of the class? The best ball player is the one who is watching for every opportunity to hit the ball or catch a player off base. The best shopworker is the one watching for every opportunity to use the shop equipment and instructional matter in the best way.

Whatever you do, do it with all your might and put your whole mind on it. That's the spirit that wins in the ball game, the shop, or anywhere else.

THE "I-DIDN'T-DO-IT" BOY

Do you know the boy in your class who is always saying, "I didn't do it"? Perhaps he may be asked only to replace something that is out of order or to pick up something from the floor and tries to get out of it by saying "I didn't do it."

If you know such a boy, compare him with the boy who is always helping to make things right. Which boy is the happier, the more pleasant, the more active, and the more liked by his classmates?

There are plenty of people in this world who are willing to do only their share, but *those who are willing to do more than their share are the ones* that get the better positions when opportunities occur.

One boy has suggested that it would be a good idea to print in this bulletin the names of the "I-didn't-do-it" boys.

ENTERING THE SHOP

How do you come into the shop? Perhaps you may say that you come in through the door, but that is only part of it. The impression that you give when you enter is just as important. By observing the 275 boys who work in the shop, the instructor has noted many different ways of entering the room. Some come in smiling, others scowling, some walk, others run, some come in quietly,

others talking. Each boy has his own peculiar way. Each boy knows the right way without pointing it out here, but do you know that a friendly "Good morning" or "Good afternoon" when you enter also helps?

By being considerate *of* others, you may more rightly expect consideration *from* others.

3. *News Items.* There are two main reasons for this part of the bulletin. The first reason is to stir up an interest in the department and in the bulletin itself, and the second is to make use of that peculiar appeal that the mentioning of a name in any periodical has upon the person mentioned. The size of the bulletin necessarily means that the news item must be brief. For example:

"The spirit among the Glenbrook boys is fine. Their willingness to help make the shop better can well be copied by others. Let's all try—it's *our* shop."

John Ley (8A Rogers) is making a fine serving tray. He is one of those quiet fellows who believes in letting his work do the shouting.

4. *Honor Roll.* An honor roll of three names has been included as a regular feature. This part of the bulletin has created more interest among the boys than any other. Perhaps a good deal of the credit is due to the principals and class teachers for their cooperation in respecting this honor roll and holding it as a mark for their pupils to attain. Another reason for the success of the honor roll is that local newspapers often mention the names of the honor pupils. By limiting the honor roll to three names each week, it is made a competitive event. The honor roll is not only for workmanship but for general all-round ability.

5. *Shop Notes.* This is the section of the bulletin devoted to instruction in the use of shop equipment and materials. In every class there are certain errors or misconceptions regarding the use of equipment and materials that are common to a large majority of the pupils. Perhaps the instructor has tried to make corrections so frequently that he sometimes thinks that they are incurable ailments to be endured as permanent afflictions. On second thought perhaps the instructor has taken too much for granted and has tried to make corrections by merely mentioning the errors and then failing to follow up his remarks by various means of instruction. Some of these common errors are: Boring a hole entirely through a board without reversing the board; using a chisel for a screw driver; calling solder, lead; allowing the shellac brush to get hard; and wearing off the slot in the head of a screw. These are some of the simple common errors that may be placed with the shop notes and which may then be used as a basis of discussion for the shop classes. Care must be taken not to try to explain tool manipulations which are too difficult. Use the shop notes for the common errors and leave the more difficult ones for thorough demonstrations. The following are examples of brief shop notes that relate to common errors:

Screws will go in much easier if you put soap or wax on them.

Use a wrench for removing nuts from bolts. Pliers will ruin the nuts.

Keep your hands back of the cutting edges of tools.

Dry paint may be removed from glass by scraping with an old safety-razor blade.

Sketches used to illustrate shop notes will help greatly to point out correct methods of tool manipulation. There are sufficient books which illustrate quite fully the uses of the ordinary tools. Many of these books have the illustrations in line drawings which can be traced and reproduced on the mimeograph machine. The use of these sketches in bulletins often serves, also, as a means of identifying the latest bulletin from previous issues. The shop notes, however, will be of little value if they are merely printed in the bulletin and then given no further thought by the instructor. The instructor must follow up the suggestions of the bulletin throughout the class instruction.

Distributing the Bulletins

If the bulletins are typewritten and reproduction limited, a bulletin on the hallway bulletin board of each school, and one in the shop will probably serve the purpose until some other means of reproduction is possible. If the bulletins are mimeographed so that a larger number is available, it is well to post one in each classroom having boys who come to the shop. The writer has found that the success of the bulletin warranted issuing a copy of it to each industrial-arts pupil.

Using the Bulletin as a Means of Instruction

Throughout this discussion various opportunities of using the bulletin for instruction purposes are apparent. Much of the instruction may not be truly shop instruction, but rather boy instruction. The bulletin will be of little assistance as a means of instruction unless it is made an integral part of the industrial-arts work. Unless it is referred to frequently and the information it contains is asked for by the instructor, it will soon pass out of existence or be read by only a few. It may take quite a while before the bulletin is established on a sound basis but it is well worth the effort necessary to accomplish this.

The writer has found that it works exceedingly well to use the bulletin as a basis or outline for the discussion part of the industrial-arts period. In this way the classes know ahead of time what topics will probably be taken up for their next period. Of course, the discussion for all classes is not alike but varies according to general class needs. In different classes the emphasis is centered on different parts of the bulletin. The writer uses various means of testing the boys on the bulletin information, and as soon as the boys realize this as part of their work, it begins to function efficiently and fulfills a real need. While the instructor should require that the bulletin be read he should use every opportunity of making the bulletin interesting and worth while so the pupils will want to read it and not look upon the reading as a requirement.

MILLING MACHINE WORK IN A CINCINNATI HIGH SCHOOL.

THE TURRET LATHE IN MODERN HIGH-SCHOOL MACHINE-SHOP PRACTICE

M. H. Yoder

THE STUDENTS who attend Collinwood High School at Cleveland may be divided into three groups.

Group 1. Those who will enter college after graduation.

Group 2. Those who will graduate, but are not going to go to college, and therefore want training in some specialized subjects.

Group 3. Those who leave school and go to work before graduation.

During the senior year, the students in group 1 select such subjects as will meet the entrance requirements of their chosen college. The boy who knows definitely that he is going to work after graduation, can elect such subjects as will best fit him for his work, and he may choose from four to six 90-minute periods daily with one or two related subjects, or he can spend the whole day in the shop. It might be well to mention that the student can select six to eight periods in the shop as early as the eighth grade if he desires to do so, and knows that he will not be able to go to college after graduation.

It might be well to give a little more detailed outline of the courses taken by the students of these three different groups, and to show how the work has been adapted to fit the specific and individual requirements of each student.

In group 1, the technical college group, the student's work consists of a general survey of machine-shop practice, and the application of mathematics to modern machine-tool operation. The shop instruction includes practical training on the engine lathe, drill press and the bench. Those students who show more than average ability in this work, are given operating instructions on the grinder, shaper, and turret lathe. The jobs for these students are set up for them by some of the faster specializing workers in the twelfth grade. It is rather interesting to note that only about 10 per cent to 15 per cent of the students enrolled in the technical division are ever able to qualify as tool-set-up men or machinists. The students in this division divide their time approximately as follows:

Classroom lectures and notes	10 per cent
Engine-lathe work	55 per cent
Drill-press work	5 per cent
Shaper work	5 per cent
Grinders	2 per cent
Turret-lathe work	3 per cent
Benchwork	20 per cent

The technical division course, or group 2, consists of students who have a satisfactory record in the technical division. The training received in this senior specializing class in machine-shop practice is very intensive. It consists of the operating and mathematical technic needed to set up jobs on engine lathes, milling machines, and turret lathes. Students who show marked ability in this work are taught toolmaking and jig work, and are also placed in charge of groups of beginners, thus gaining a chance to develop executive ability.

Group 3 is for students who leave school at the age of sixteen to go to work. These students may learn how to operate any standard machine tool. If any of the students in this group show marked ability in their machine-shop work they are allowed to do the work of the students in the senior specializing group, of group 2.

From the outline of these courses, it can be seen that the students in Collinwood High School receive not only a thorough shop training, but a training that is made to fit in with their future plans; whether they are going to go to college after leaving school or whether they will be compelled to go out and work either after or before their graduation.

The machine-shop equipment at this school is of the most modern kind, and it is fortunate that besides the modern types of engine lathes, drill presses, shapers and milling machines, a turret lathe is also provided. The students thus have an opportunity to learn how the turret lathe is applied to actual manufacturing conditions.

The increasing tendency in modern machine shops toward the replacement of engine lathes by turret lathes, makes it almost imperative that the students—who are our future executives—should have more than a superficial knowledge of modern turret-lathe practice.

A great many instructors and even students erroneously believe that the turret lathe is purely a production machine. In view of this, they think that it is not worth while to give instructions on the turret lathe, as they think that the students will be able to pick up this experience very readily after leaving school. The experience with the students at the Collinwood High School shows conclusively that a good lathe operator does not necessarily make a good turret-lathe operator. This is due to the fact that the turret lathe requires different tooling practice and set-ups than are required on an engine lathe.

It is true that the student who has worked on an engine lathe is able to grind the cutters used on the turret lathe, and has the ability to get the cutters in good working order promptly, since the cutters used on these two machine tools are somewhat similar. But the tooling application and tool set-ups of the turret lathe are quite different from those on the engine lathe. Where the lathe takes but one cut at a time, two or more cuts are taken by the turret lathe, sometimes with the same tool holder and at other times with separate tools. Then too, the size, shape, and adjustment of the tools for the turret lathe necessitate a period of special training which can be given only on a fully equipped and tooled turret lathe.

Not only are the tools themselves different from those used on the engine lathe, but the method of grinding the cutters is very often different. In addition to these variances, different cutting speeds and feeds are used, due to the different cutting methods employed on the turret lathe. From all of this it can be seen that it is very necessary to give the students specialized training on the turret lathe if they wish to prepare themselves to operate this tool efficiently under modern manufacturing conditions.

The two classes of work produced on a turret lathe are bar and chucking work, and tooling equipment for both of these two types of work are required. However, it is sometimes deemed inadvisable to have very much tooling equipment for chucking work, due to the difficulty of disposing of the finished parts produced by chucking work.

The castings which are required for giving instructions in chucking work, create an initial expense that is somewhat greater than with pieces made from bar stock. In case of spoilage, too, the pieces produced from chucked work can be salvaged to a less extent than can pieces made from bar stock.

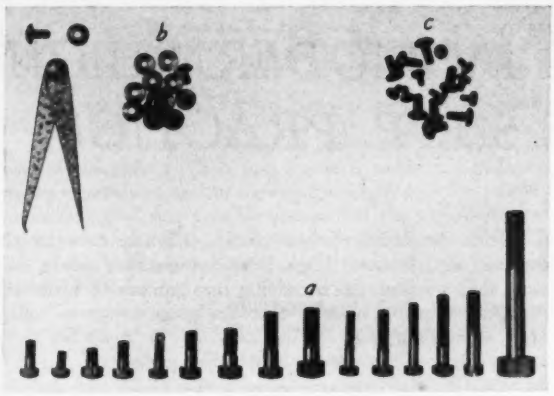


FIG. 1. (a) CAP SCREW MADE ON THE TURRET LATHE, (b) OVAL HEAD RIVETS AND WASHERS FOR CALIPERS, (c) KNURLED HEAD SCREWS USED ON GRADUATED DIALS ON MACHINE TOOLS.

It is, therefore, readily seen that the greatest part of the turret-lathe instruction should be and is devoted to bar work, such as bolts, cap screws and turned parts of all kinds.

The turret lathe at this school last year turned out over 2,000 U.S.S. cap screws ranging in size from ¼ in. to ½ in. in diameter and of various lengths, half of them being placed in the school's own stockroom and the other half in the stockroom of the board of education where they are issued to other schools for repair and general maintenance work. The wide range of diameters and lengths of some of these cap screws is shown in Figure 1 at *a*.

With the installation of the automobile-repair department next year, it is planned to make in addition about 3,000 S.A.E. standard cap screws in different diameters and lengths. These cap screws will be used not only in the stockrooms of the automobile-repair department of the Collinwood High School, but will be used also in the repair department of the board-of-education garage. It is planned too, to make square-headed set screws and other jobs that are suitable for the turret lathe.

Many instructors omit the turret lathe from their machine-equipment list, because they are under the erroneous belief that it is not a paying investment for educational work in a high-school machine-shop course, as its original cost is somewhat higher than that of an engine lathe. However, the large amount of work that was turned out by the turret lathe in this school for maintenance work, ought to convince them that their assumption of high cost is not correct. In addition, one must consider not only the increased output of the turret lathe over the engine lathe, but also the fact that the boys are given training on a machine tool that is firmly and well-established in modern manufacturing plants.

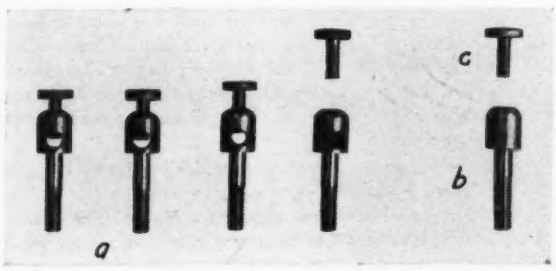


FIG. 2. (a) BINDING-POST TERMINALS, (b) BINDING-POST BODY, (c) BINDING-POST THUMB SCREW.

Each boy in the first term operates the turret lathe in turn for a total of 3 to 4½ hours. By taking the boys in turn in this manner all of them have an opportunity to not only operate the turret lathe, but they can compare the quality of the work with that done on an engine lathe, and at the same time it serves as an introduction to illustrating the application of the turret lathe for the quantity production demanded by interchangeable manufacture.

The jobs, having been previously set up and demonstrated by the instructors to the boys in the specializing group, these students are then required to grind and make the cutters for a given job, and then to take their turn in setting up the different jobs on the turret lathe and in breaking in new operators. In case none of the specializing-group boys are available, the most intelligent and capable boys of the first-term group are sometimes used on the set-up of the work very successfully.

The question arises whether the operation of the turret lathe after the job has already been set up, is really of educational value or whether it is merely routine work for the specializing students who have set up the jobs on the turret lathe.

Each set-up man is used to break in a first-term student to operate the machine. This usually takes about 15 minutes. The set-up man then goes to another job, but he must continue to check up the first-term operator to see that the product he turns out is satisfactory. A certain amount of executive ability is thus developed in the student who has charge of this supervisorial work.

Bearing in mind that the product of the school is primarily *the boy* and that the work turned out by him is *incidental*, it can be plainly seen that the output of any machine used for educational purposes will, in a given period of time, fall short of that produced under production manufacturing conditions.

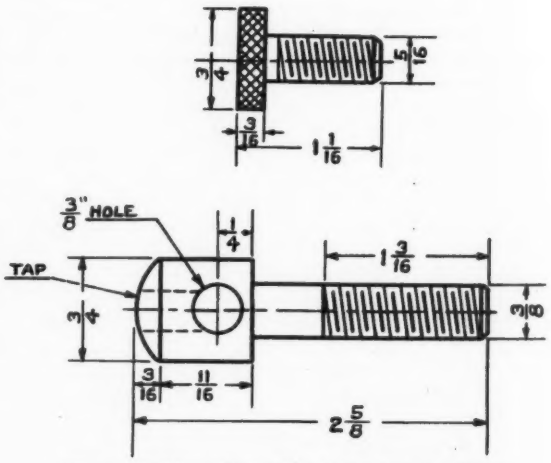


FIG. 3. BINDING-POST BODY AND THUMB SCREW.

Since the setting up and tooling of the jobs are of greater value than the actual operation of the turret lathe, more time should be spent on this phase of the problem. This being the case, it can be seen that educationally it is very profitable to use the turret lathe to produce as few as two pieces of a kind. In this way the student has more opportunities to become acquainted with a greater number of tooling set-ups.

It might be well to mention that the turret lathe is in no sense a strictly quantity-producing machine, as it may be successfully used on jobs requiring from 5 to 35 pieces. Taking two or more cuts all at one time, with heavier feeds and faster speeds than an engine lathe, the shorter actual cutting time on the turret lathe more than offsets the slightly increased tool-set-up time.

There is an added advantage in that the exact duplication of each piece is assured, due to the fact that the tool set-up

remains the same throughout the entire job. On the engine lathe it is usually necessary to reset and adjust the tools and cutters for every new piece made.

Let us study one of the simplest projects made on the turret lathe and see how it fits into the plan of instruction. The turret lathe at the Collinwood High School is a No. 2 Warner & Swasey, which has a capacity for turning bars up to 1 in. diameter by 6 in. long, and can swing chuck work up to 14-in. diameter. It is fitted with a plain cross slide provided with both a front and rear tool post.

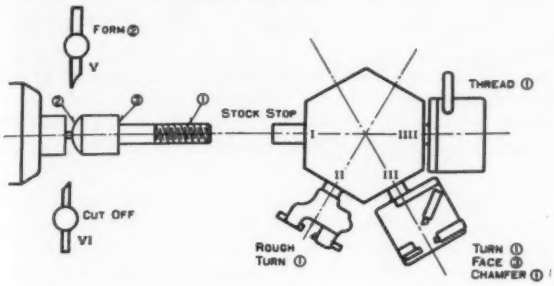


FIG. 4. TOOLING LAYOUT FOR BINDING-POST BODY.

The first project consists of drilling and countersinking small pieces of bar stock, ⅞-in. diameter by 3⅛ in. long, used as first pieces by the students on the engine lathe. About 200 of these pieces are made at one time, enough for both the beginning students and the day and evening classes.

These pieces of bar stock are centered in the turret lathe, avoiding the usual waste and loss of time by the students in waiting for their turn at the sensitive drill press, or small speed lathes generally used for this operation. Although this item of time may appear small, it amounts to quite an appreciable amount when the classes are large. The set-up time for the tools on this simple operation does not take an average boy more than twenty minutes at the most.

Referring again to Figure 1, *a*, we have here the cap screws mentioned previously as having been made for the school's own stockrooms for general repair and maintenance work. These cap screws are made in lots of from 50 to 100 pieces at a time, depending upon the stockroom demands. The filister-head screw shown near the right end of the illustration is made in lots of about 12 pieces at one time and with one tooling set-up.

Figure 2 shows an interesting project. Parts *a* are binding posts used in the electrical laboratories of the school for connecting up instruments, small motors and other devices on the test floor. These binding posts consist of two parts, the body *b*, and the thumb screw *c*. The dimensions of the two parts are shown in Figure 3. The stock used is ¾-in. brass rod, and the binding posts are made in lots of about 60 to 75 at one time.

The tooling layout for the body *b* is shown in Figure 4. Figure 5 shows a close-up of the tooling set-up, and Figure 6 shows a student producing binding-post bodies on the turret lathe.

Referring back to the tooling layout, Figure 4, the tools are indicated on both the cross slide and hexagon turret.

Position I is the stock stop. This stop insures that the brass rod is fed to the proper length.

Position II is a single cutter which rough turns diameter 1.

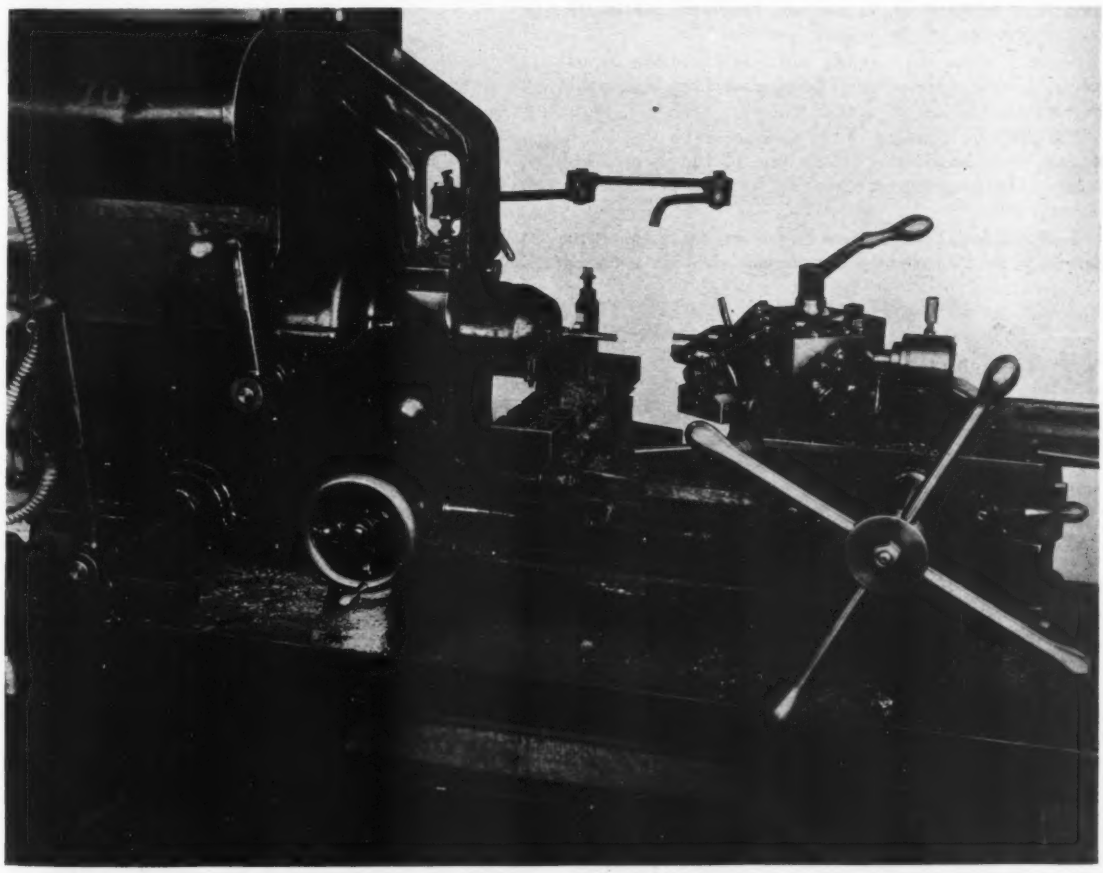


FIG. 5. A CLOSE-UP PHOTOGRAPH OF THE TOOLING SET-UP FOR THE BINDING-POST BODY.

FIG. 6. ONE OF THE STUDENTS OPERATING A TURRET LATHE FOR MAKING THE BINDING-POST BODY

Position III holds two cutters, one for finish turning diameter 1 and for square facing 3. The other cutter chamfers 1 at the end for starting the die head.

An automatic opening die head in Position IV cuts a ⅜-in. U.S.S. thread 1 in. long on diameter 1.

The forming tool in the rear tool post, on the cross slide rounds off 2 in operation V, and the cutting-off tool in the front tool post cuts off the piece in operation VI.

Figure 7 shows the forming cutter at *f* and the cut-off cutter at *d*, both of these cutters being made from high-speed-steel tool bits.

The first time that one of the students set up this job, it took him three hours; the second time he did it in thirty minutes. The operating time is about 16 pieces per hour for an average boy.

This completes the operations on the first chucking. After the pieces in the lot have been run through, the piece is turned around, the dome end 2 is drilled and tapped for a 5/16-in. U.S.S. thread.

Figure 8 shows the set-up for this second chucking. The piece is held in the automatic chuck.

Position I holds the starting drill.

Position II drills the hole for tapping.

Position III taps a 5/16-in. U.S.S. thread in the end.

The set-up time for this second chucking was 20 minutes by the same boy who set up the first chucking. The operating time was 60 per hour or one every minute.

The knurled screw *c*, Figure 2, is also made from ¾-in. brass rod. The set-up time on this piece being 2 hours and the operating time 30 pieces per hour. The dimensions of this knurled screw are shown at *c*, Figure 3. Cutter *e*, Figure 7, shows the cutter bit that was used to chamfer the corners of the knurled head, after a knurling tool had been used to knurl the head.

The brass taper pins, Figure 15, are made from ¼-in. brass rod in quantities of about 60 pieces. They are used as coupling pins in shafts, and will shear very easily, thus protecting machinery which may be handled carelessly by the boys.

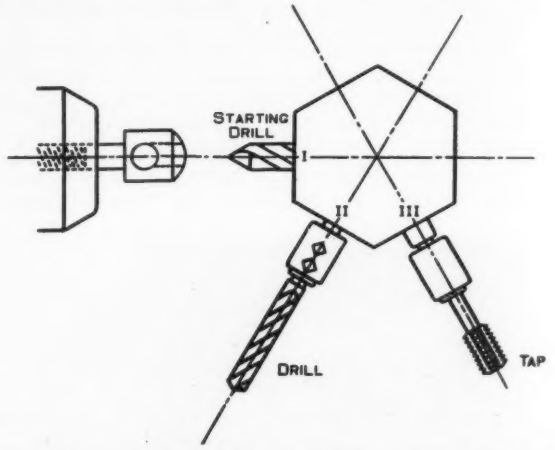


FIG. 8. TOOLING LAYOUT FOR SECOND CHUCKING OF BINDING-POST BODY.

The set-up time on these taper pins was 1¾ hours, and the production rate 40 per hour for one boy, and 36 per hour for another. At first the set-up time on this piece appears excessive for this simple job, but the students find it quite difficult to adjust the back rests and cutters in the taper-forming box tool to cut the correct taper.

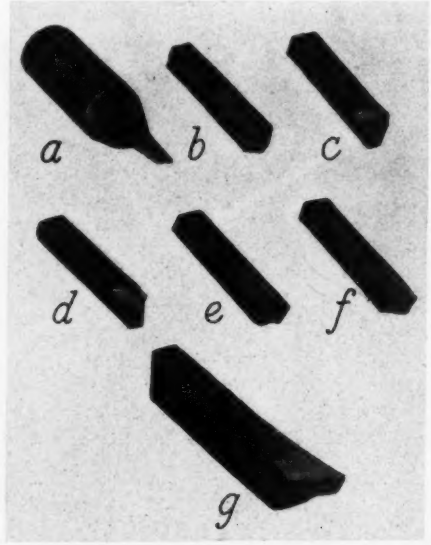


FIG. 7. (a) STARTING DRILL USED ON SEVERAL PROJECTS. (b, c, d, e, f, g) FORGED CUTTERS MADE BY THE STUDENTS AND USED ON THE TURRET LATHE.

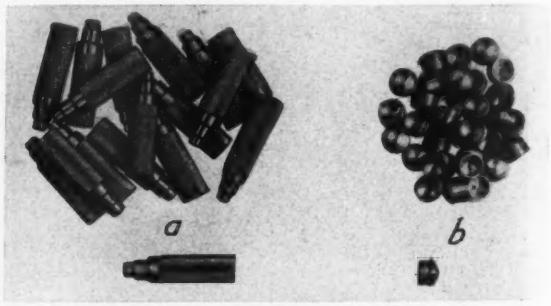


FIG. 9. KNURLED HANDLES AND END CAPS FOR SCREW-DRIVERS.

By taking a piece of cast iron ½ in. in diameter and 1⅜ in. long, drilling and then reaming it with a No. 2 taper-pin reamer, the student made a very satisfactory taper gauge, which allowed the taper pin to project from each end.

Figure 9 shows an interesting project developed by the school. Several sizes of screwdrivers are made by the boys. This necessitates that the knurled handles *a* and caps *b* are made in various sizes on the turret lathe.

Figures 10 and 11 show the drawings of two sizes of the screwdriver handles and caps, which are made in lots of about 110 pieces at one time, as there is quite a demand for these screwdrivers.

The knurled handle presents a little more difficult tooling than the previous pieces that we have described. Besides the outside forming operation, it is necessary to drill two different

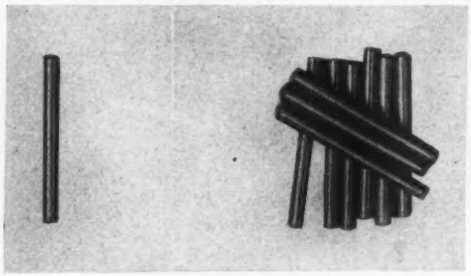


FIG. 15. BRASS TAPER PINS.

sizes of holes on the inside and ream one of them. Figure 12 shows the tooling layout for the handle shown in Figure 10. The order of operation is as follows:

Position I: Feed bar to stock stop to get proper length.

Position II: Knurl diameter 1 with knurling tool.

Position III: Start bore 2 with starting drill.

Position IV: Drill 2 with drill held in a Horton drill chuck.

Position V: Remove drill from Horton drill chuck and insert ½-in. reamer, reaming hole 2 approximately ½ in. deep for fitting of end cap.

Position VI: Drill 3 with drill held in marrow chuck.

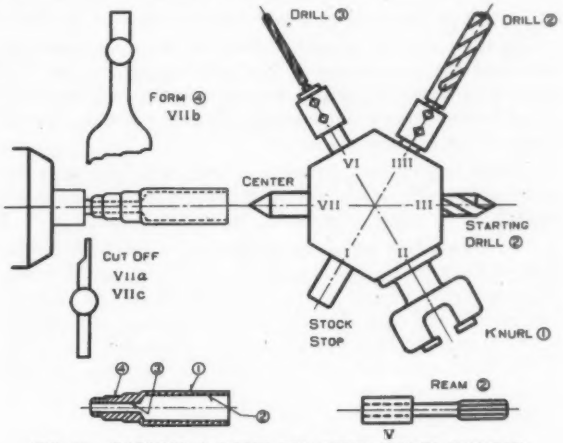


FIG. 12. TOOLING LAYOUT FOR SCREWDRIVER HANDLE.

Position VII: A supporting center is used in the turret hole to give support to the piece while the cross-slide cutter on the rear tool post forms 4, the cut-off tool on the front tool post partially cutting off the piece previously.

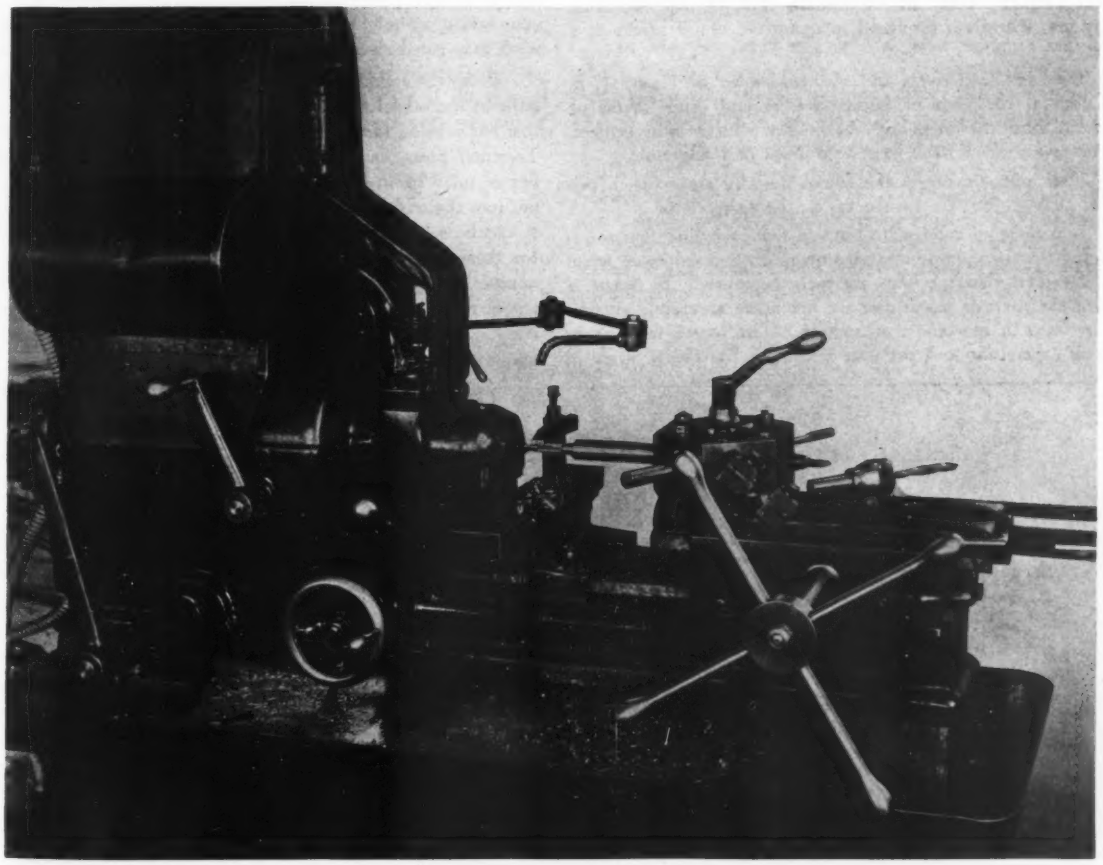


FIG. 13. A CLOSE-UP OF THE TOOLING SET-UP FOR THE KNURLED SCREW-DRIVER HANDLE.

Referring again to Figure 7, *a* is the starting drill used in Position III, *g* the forged cutter for forming 4, and *d* the cutter used for cutting off the piece.

A boy from group 3 (group of boys who must leave school before graduation) set this job up in 3¾ hours the first time, and a second set-up with all the tools on hand took him 30 minutes. The operating time for an experienced boy is 12 pieces an hour and an inexperienced student 10 per hour.

In all of the tooling set-ups described so far, we have not mentioned the adjustments of the tools themselves, nor the methods of setting the turret stops so that the tools mounted on the hexagon turret will automatically stop when the desired length of cut has been made.

These adjustments, however, of both tools and stops are easily and rapidly made due to the ingenious devices incorporated in the turret lathe by the manufacturers.

As screwdrivers are always in demand, a fair price can be charged for them so that a profit can be shown on this work. The screwdriver project is an exceptionally good one in showing the type and class of work that can be made on the turret lathe without excessive waste material. Then too, the pieces do not require the accuracy that would be necessary in much of the bar-machine work, hence, this project has a value far in excess of the cost of the materials used.

The end cap *b*, Figure 9, has one operation that requires accuracy. The ½-in. diameter is held to +.001 in. so that a good driving fit is provided where it fits into the knurled handle.

Figure 1, *c*, illustrates another interesting maintenance item that is produced on the turret lathe. The knurled-head screws used on the graduated dials and collars of lathes and other machine tools, are continually lost by the students. They are, therefore, produced in quantities of 75 pieces at a time.

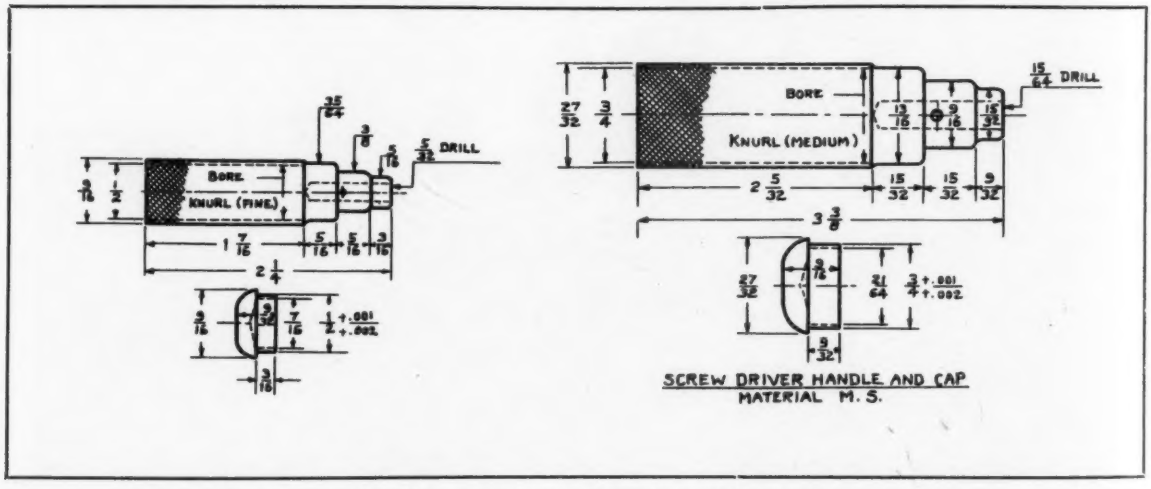
The oval-head rivets and washers shown by Figure 1, *b*, are used at the joint of hermaphrodite and other forms of calipers. Both the rivets and washers are a turret-lathe project. As many as 600 of these have been made in a single lot.

Flask pins for use in the school foundry are made in two sizes. These, too, are turned up on the turret lathe.

It may be of interest to know a few facts and figures regarding the surprisingly low percentage of material waste when one considers that the boys are mere beginners. By waste is meant the parts or pieces that are not made accurately enough to be used in machine construction. This waste may be as low as 2 per cent to 5 per cent in lots of 100 pieces, while in lots of 5 to 6 pieces it may be as high as 50 per cent. In comparison, we might mention that waste in the first-term lathe work may run between 75 per cent and 90 per cent.

FIG. 14. A STUDENT OPERATING A TURRET LATHE, MAKING A KNURLED SCREWDRIVER HANDLE.

From the foregoing, it can be seen readily, that the turret lathe in the school shop can be used for turning out a product that has a value far in excess of the cost of the materials used. Terminal posts, cap screws, set screws, and pieces of a like nature, may be invoiced at their market value when they are put into the school's own stockroom. The screwdrivers, Figure 9, can be sold to the student body at a profit, as the demand for them in a large school will always exceed the supply. A number of other purely maintenance items for use around the school that can be made on the turret lathe, will easily suggest itself. In this way the turret lathe really becomes a paying investment in the school shop.



FIGS. 10 AND 11. DRAWINGS OF TWO SIZES OF THE KNURLED SCREWDRIVER HANDLES AND CAPS.

A DESIRABLE METHOD OF TEACHING MANUAL TRAINING

Sheldon R. Parker

At the beginning of the semester or school year, the teacher should make careful preparation for the first session of his manual-training class. Tools, drawings, and materials all should be on hand. The room should present a strikingly well-planned layout. There should be some finished projects, others in various stages of completion, one or two just assembled. The entire atmosphere should emphasize that work can be started at once. There also should be some drawings on the walls, and a few simple blackboard sketches made. The eye of a prospective pupil takes in a great deal; even young boys possess a great deal of observant, yes, even critical power. A part of this, exhibited by the alert children, seems to communicate itself in some degree to the nonwatchful. Tools should form part of the display, as they do much to arouse the beginner's interest.

With an average class of about twenty boys, it will take nearly a full period to register the group, explain the use of the foot-rule and how to use such tools as the try-square, compasses, and marking gauge. After having mastered the measuring, the boy is ready to begin on his first model. The first one which I use is a doll house constructed of cardboard and wood. The sides, floor and roof to be of cardboard, and the sills of wood. This gives the beginner experience in measuring correctly, also a chance to become familiar with some of the tools.

After having laid out the house on cardboard, the boys are ready to make the sills. These may be formed of rough pine lumber, squared up to any desired dimensions, say ⅞ in. square. Plan to allow at least ¼ in. for waste. Here the instructor has a chance to explain what tools are to be used, and how they are to be used. He also must introduce his pupils to the method of carefully planning a job before going ahead with it. After having squared the sills to the desired size, and after having cut them to the right length, the house is ready for assembling.

Suggestive Outline for Graded Course

Grade Six

Doll house
Garden stake
Toothbrush holder
Pencil holder (small)
Pen tray
Knife rack
Broom rack
Mat rack
Key rack (small)

Grade Seven

Key rack (large)
Knife box
Shelf
Postcard holder
Whisk-broom holder
Book rack
Watch holder
Door stop (small)
Taboret (small)
Candlestick

Grade Eight

Ruler
T square
Folding hat rack
Envelope box
Handkerchief box
Footstool (upholstered top)
Door stop (large)
Stepladder (small)
Book ends

Special Projects

Smoking stand
Sailboat
Sewing cabinet
Sewing screen
Boudoir lamp
Book ends (with inlay)
Taboret (large)

The foregoing list is not to be confined wholly to the grades mentioned, but as a child advances in skill, he is allowed to take up more difficult problems. Special projects also may be made, by individual pupils who have previously proved their ability to undertake more difficult work.

Manual-training work should not be conducted solely upon the line of project making without taking workmanship and cost into consideration. These two features, together with variety in constructive detail, must always enter into every phase of this work.

The pupil should be made to estimate the material required for each project. The lumber order therefore, should give some insight in allowing for waste and estimating the cost. After the lumber bill is made out, the boy is allowed to begin on his model.

In harmony with this, it is a good thing to encourage pupils from the seventh and eighth grades, to bring articles from home which need repairing. Short demonstrations may then be given to show just how the repair is to be made.

Watchfulness and guidance are the main considerations in the work. The pupil feels the burden of responsibility in creative work, and he has not yet developed the skill of seeing just how the project will look upon completion. The instructor must, therefore, spare no effort until his pupil has mastered the use of the common tools, and has acquired skill in planning his work or following the directions given him by others.

FRENCH COMMODE—1780-1790.
Mounts by Pierre Gouthière. Cabinet work by Riesner. Photograph by The Metropolitan Museum of Art.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *S. J. Vaughn* *J. J. Metz*

PRACTICAL VERSUS PEDAGOGICAL

We hear much today regarding the schooling and industrial experience of vocational and industrial-arts instructors. It is not uncommon to find executives who favor the experienced industrial man in all school shops, and again we find many executives who prefer the school-trained teacher. Both are perhaps approaching the extreme, for an industrial man without teacher training is as incapable of doing satisfactory teaching as the pedagog without any industrial experience. A well-balanced teacher has a fair knowledge of both experiences.

The vocational instructor should have an abundance of experience in his particular trade, while the industrial-arts instructor should have a generous supply of both industrial and pedagogical training.

The industrial-arts instructor comes face to face with the duty of giving guidance; offering opportunities for exploration; preparing inquisitive youth to launch into studies which will return a correct knowledge of the workaday world. His task is of much more importance and demands an even more complex training than that of the vocational instructor, who teaches but one trade.

The advisability of the industrial-arts instructor delving into all industrial endeavor; keeping abreast of improvements; knowing the changes in working conditions; the interdependence of different industries, and in fact everything a prospective recruit to industry will wish to know about, cannot be denied. He need not know one trade thoroughly, but must have a good general knowledge of all industry, at all times. His responsibilities are great and cover a much larger field than that of the vocational instructor.

To have an industrial background, gained through actual participation in industry or through observation and study, is an essential to good teaching in any school shop. To have a pedagogical experience through teacher-training courses is even more important —for to know a thing does not imply the ability to impart this knowledge to others. To play the old game of "teeter" we must keep the plank balanced, not overweighted on either end.

A BROADENING VIEWPOINT

Investigations in a number of schools this summer revealed some very interesting things with reference to the work of teachers and students of vocational and industrial education. One of the most interesting and significant discoveries was the fact that a larger percentage of such students and teachers were taking theoretical and general cultural courses. Such courses were being pursued as history, economics, sociology, psychology, history of education, mathematics, physics, chemistry, etc. A noticeable interest was manifested in getting work lined up that would eventually secure a degree for the student.

The teacher of shop courses whose memory goes back twenty or twenty-five years, will recall how heartily and lustily, and sometimes belligerently, such summer-school students disclaimed any need or any desire for such so-called "cultural" courses. It was "tool practice," "manipulative processes," and "sequential exercises" that held the center of the stage.

A well-known teacher of manual training repeatedly told his students that as much culture was to be gained from sharpening a cold chisel as from the study of languages, literature, or history. In this way, untold injury was done to the progress of manual and industrial work. A definite antipathy was fostered between the two phases or means of education.

Now, happily, we are beginning to realize that all education worthy of the name points to one and the same end, namely, the development of the native powers of the individual and the placing of such powers within the individual's control so that he may live an intelligent and efficient life.

Students must not be taken out of the shops. Sufficient emphasis must always be placed upon the mechanical and manipulative phases of industrial work to insure standard skill and ability, but this does not need to exclude the theoretical and cultural phases of education for the same students.

Let's have more education in our shops and then we shall surely have more shops in our educational system.

SIZE OF SHOP CLASSES

The question about the proper load for the shop-teacher comes up again and again. Ignoring entirely the point of view of the superintendent or principal who, because of lack of space, is forced to increase the student number per class whether he wants to or not, let us study the problem from such information as is available today.

A number of studies have been undertaken to determine the optimum size of class for academic subjects. These studies have proved quite conclusively that pupils in classes of 40 to 45 ranked equally high with those from classes that were limited to a membership of 20 to 25. No doubt the larger classes entailed more work for the teacher, but they also increased his efficiency. They brought about refinements in methods that helped him do a better job, and they spread his influence over a greater number of pupils.

So much for the academic subjects. Now what about the shop subjects? Experienced shop-instructors admit that they abhor classes of 6 to 10 students. They admit further that such small classes receive less attention, less good teaching than larger classes because there is little in a small class to arouse the teacher's enthusiasm. We may, therefore, safely say that a class of 10 is the lower limit, below which efficiency is not to be looked for. What about the upper limit, then? Unfortunately, we have no definite studies, such as were made in academic classes, to show what this upper limit should be. For a while it seemed to be fairly well established that a shop class should not exceed 20. Probably this is the upper limit beyond which efficiency decreases, but it must not be forgotten that this number was determined more or less arbitrarily. Future study alone will prove whether the shop class may not be increased beyond this point without detriment to the student. If a serious study of the problem would show that this could be done, it would mean, no doubt, that the shop-teacher would have to refine his methods so that the increased burden would not have a detrimental effect upon him. A greater burden properly carried would mean greater efficiency, more personal satisfaction to the teacher. It would mean more careful budgeting of the teacher's time, more thoughtful planning of lessons, more efficient classroom organization, more adopting of the methods worked out by successful shop-teachers elsewhere. Above all, it would mean a greater number of students taught without increasing the cost per student.

What the proper size of the shop class is, and how the teacher is to take care of the larger class if such is found to be necessary, is of course problematic and can be discovered only by future study. But no matter what the results of these studies may be, it is sure that our progressive shop-teachers will discover some way to take care of their problem. They, too, will work out methods, if enlargement of classes is found to be necessary, to meet the demands of the modern trend of increased production without sacrificing previous standards of excellence.

IMPROVEMENT OF TEACHERS IN SERVICE

A teacher's proficiency either improves or deteriorates—it cannot remain stationary and constant. Many a teacher has found his progress and promotion completely blocked by the finality of his plans and the unchangeableness of his methods and opinions. For many years it was quite the custom among shop-teachers to lay out their courses, blue print their exercises or projects, and to pursue with unvarying precision such courses, exercises, etc., from one year to the other. It was during the time when such procedure was common, that all the shopwork and related courses suffered such a damaging reaction.

Of course, in the earlier days of this work, the teacher was so completely handicapped with numerous and unreasonably large classes, with inadequate equipments, with hostile educational sentiment, and with unreasonable demands and duties, that it seemed quite impossible for him to devote much time and thought to his own improvement, or to the improvement of his courses and methods. Some of these handicaps are now happily removed; and the progress of the industrial and vocational work depends very largely upon the improvement of the individual teacher while in service. When the new teacher comes fresh from normal school, university, or factory, he is very naturally quite theoretical, and his theories are to him the very last word in wisdom. The factory-trained man is no less theoretical than the school-trained man. He is theoretical about the courses and methods of teaching, while the school-trained man is more or less theoretical about the mechanical practices and principles of the trade or occupation whose elements he finds himself trying to teach. Both are doomed to complete failure unless they are disposed to *begin to learn.*

Progressive supervisors and directors are beginning to outline definite courses and problems for investigation for their teachers. Some have mapped out reading assignments for their teachers, while others have organized regular conferences or classes for their teachers. In such a program of study, the supervisor or director has an opportunity to get his own ideas, principles and methods into operation among his teachers. Furthermore it acquaints the supervisor with the various attitudes, dispositions, and qualities of his teachers. Just as important is the fact that it gives the teachers a similar study of the man for whom they are working and whose opinion of their own work and worth is the final authority that determines their success and promotion.

Not only does this kind of an arrangement bring the supervisor and his teachers into a fuller and better understanding, but it also brings both into a bigger and more familiar grasp of the field of work in which they are engaged. It has the further advantage of being a kind of training school for supervisors and directors. At the present time, succession to a supervisorship seems to be a haphazard and accidental matter. There seems to be no direct line of approach or training for one who aspires to such a position. The improvement in service plan suggested here and in operation in some of the best school systems would go a long way in the direction of preparing teachers for supervisory work.

MIND AND BODY

Each of us have mannerisms of which we are not conscious. The conscious mind ceases to function in habitual acts and considerable part of our activities are carried on without discrimination. This habitual doing has great value in our physical operations. If it was necessary for the mind to function in every operation of the body, the common activities of life would be slowly performed and irksome.

The proposition that we have inadequate time in educational process for the drill necessary to establish habits, has not relieved the teacher of the obligation of seeing to it that habits of desirable sort are in process of formation. A slovenly child must be improved in conduct by the school experience. The teacher of the arts is most liable to indifference to the method of work because results are visible.

The old method of schoolwork was painstaking. The recent method of schoolwork is directed to get a definite result with little concern as to the exact order of procedure. We are stressing the individual in our modern teaching and technical process is rather overlooked with the result that the perseverance which will ultimately result in good habits of work and the success that can only come to the majority by persistence may never be attained.

SPEED

Tests and scales to measure achievements of individual students have been devised, which place proper emphasis upon the time element in the completion of a certain amount of work.

Apprentices in our modern industrial plants, whether they learn their trades by completing a carefully planned course of study under competent instructors, or by being left to the "tender" mercies of a mechanic to help them stumble into their trade, are bound to learn that speed plays an important role in determining the size of the pay envelope at the end of the week. They come in daily contact with bonus systems, and piece-work rates incorporated in the shop methods as a stimulant to speed and increased production. The big thing in industry today—PRODUCTION—becomes a part of their very fiber.

The organization of our school trade shops, to teach rather than produce in the industrial sense, has robbed the school of a valuable asset and placed a responsibility directly upon the shoulders of the instructor.

The attitude of accuracy first and speed second in our schools is justified. The rotation from one fundamental operation to another before the desired rate of speed is acquired, also is justified if the contemplated course of study is to be completed. Yet it is unfair to the student to accept anything less than maximum speed with accurate work.

Industry too often looks upon school shops with a suspicious eye. We know that speed is a vital factor in industry's scheme of organization and we know that industry is looking for this quality in our graduates. It is our plain duty, therefore, to both industry and to the student to see that we stress speed perhaps more than we have in the past.

AT THE BEGINNING OF THE SCHOOL YEAR

J. I. Sowers, Director of Vocational Education, Miami, Florida, issued a bulletin to his teachers which contains much that is worth while to industrial-arts and vocational teachers. The first page of this bulletin contains the following:

"We have swung around the orbit again and find ourselves on the threshold of a NEW SCHOOL YEAR. No matter how or where you have spent the past vacation period, we hope it cleared away the rust of formalism, any cobwebs of prejudice and routine, and any individual grouch you may have acquired in your past teaching experience.

"This year is a *NEW* year, it is the opening of a new chapter in each of our lives, and in the lives of those we are to have under our instruction. It ought to be a different year, a better year, a more progressive year. Let us live and do our work this year as though the clock of the world were striking twelve in this school year of 1927-28. It is to be hoped we have come back from our months of vacation refreshed in body and spirit, and holding in our minds a new vision of service.

"Let us now resolve here on the fringe of the new year to think of our profession in new terms of service. We understand now perhaps as never before, that *education* and *employment* of her people is the very gateway to a nation's greatness, and such place as we may attain among other nations will be measured by the ability of our people to think straight and to serve largely and well in man's upward struggle."

OBJECTIVES OF THE WOODWORKING COURSE

C. M. Gilmore, Dir. Manual Arts, Hazard High School, Hazard, Kentucky

The woodworking phase of a manual-arts course should be presented in a well-rounded manner if it is to contribute the greatest amount of good to the boys taking it. Each of the objectives should receive a just amount of time, thought, and effort. There should be no overemphasizing of one or more of the objectives and a slighting of the others. Well-roundedness should obtain. To maintain this well-roundedness it is quite necessary that the objectives be kept in mind constantly.

What are the objectives of woodworking? The usual objectives are as follows:

Creditable Workmanship

This is a very important objective. The boys should be encouraged to execute their projects as well as they possibly can. There should be fostered within them a keen appreciation of good workmanship. As a rule, a majority of the boys of a class will do their projects right up to the extent of their abilities. There will be some, however, that will need encouragement. Do not expect the same degree of workmanship from each boy of a class. Differences in ability will necessarily result in a variance. But each boy of the class should do his projects creditably.

Proper Wood Finishing

Boys who make their projects well, oftentimes, in just a few minutes, ruin them at the finishing bench. It is no easy task to teach boys how to finish their projects properly. They usually get in a hurry about the time they arrive at the finishing room and try to do the finishing job quickly. This invariably leads to disappointment. Time and patience are essential elements in successful wood finishing and this fact should be impressed upon the boys. Then, there is a mass of information that the boys should have to finish their projects effectively. They should know the kinds of stains, the advantages and disadvantages of each, how to apply the different stains, when and how to apply wood fillers, how to apply shellac, the different kinds of varnishes, conditions necessary for good varnishing, the different kinds of finishes and how to secure them, selection and care of brushes. The objective of proper wood finishing requires no little amount of thought, energy and time.

Correct Tool Usage

Occasionally boys will use the blade of a try-square for a screwdriver; a mallet for a hammer; a ripsaw for a crosscut saw; sandpaper for a smoothing plane; drawing knife upside down; a smoothing plane with its blade set too deep. Each tool in the shop is for a definite purpose and the boys should be taught the correct handling of the various tools as the tools come into use in the course. The boys should not be permitted to use any of the tools incorrectly or to use any tool for any purpose other than the one for which it is designed.

Resourcefulness

It happens once in a while that a boy will saw one of the pieces he is to use too short, or make some other mistake in construction. When this takes place something must be done. Shall the boy junk the project which he has thus far constructed, secure another supply of material and start over again? Or shall he try to figure out some way to proceed with the same project, making it smaller than the original plan or changing the original design and making a slightly different object? The boys should be encouraged to be accurate and sure in the construction of their projects, but should a mistake occur, it is better to alter the dimensions of the plan or change the design than to junk the project and begin again. Boys should be taught how to be resourceful.

Correct Designing

By the time the boys have advanced to elementary furniture or cabinetmaking, the objective of correct designing becomes rather prominent. As a rule, boys in furniture making are required to make their furniture projects from their own designs. To make their own designs, they must know about proportion, symmetry, harmony, adaptableness. They also should know about period furniture; the difference between good, and cheap, furniture; how good furniture is constructed, and the materials generally used in the making of good furniture. Designing and making furniture projects brings the boys right up against the outside world, to the extent that they begin to observe and come in contact with the furniture products of the factories.

Knowledge

Woodworking is not intended entirely for the training of the hands. There is a vast amount of knowledge to be gained in connection with it. The lumber which the boys use in making their projects is a product of an immense industry which embraces many worth-while informational facts. Many of the tools in the shop have fascinating histories and it is interesting to know about the different processes through which each tool has passed before it comes to the hand of the artisan. A knowledge pertaining to the making of glue, varnishes, turpentine, brushes, paints, enamels, fillers, and stains is not only interesting but worth while. Woodworking should contribute liberally to the boys' fund of general information.

Shop Management

The boys should be taught how to take care of the shop. A sense of orderliness should be instilled in them. They should be taught to keep their benches in order and tools in place, and not to leave the shop till things are in good order. Some of the boys will, no doubt, start shops of their own at their own homes. If they are taught to take proper care of the shop at school, they will carry the training to their home shops. The course in woodworking really is making a valuable contribution to the boy's sense of self-reliance if it arouses within him sufficient interest to cause him to start a shop of his own at home.

Ample Ideas of Construction

The course in woodworking should be rich in interesting and appealing projects. The boys will work more zealously at projects which interest them, hence they will complete a greater amount of work and thus learn about a larger number of types of construction.

We might add more objectives, especially if motor-driven machines are used a great deal in the woodworking course, but the *number of objectives* is not a matter of such great concern, as is the *proper distribution of attention, thought, time and energy* over the various objectives. The course in woodworking will not make its most beneficial contribution if one or more of the objectives be overemphasized, and the others, equally important, slighted. What we must aim at specially is well-roundedness.

TOYMAKING IN DETROIT SCHOOLS

Earl L. Bedell, Supervisor of Manual Arts, Detroit Public Schools

The Detroit *News* on December 11, 1926, carried the following news item:

Making 9,000 Yuletide Gifts

Detroit Public-School Pupils Work to Give Real Christmas to the Unfortunate. The article continues:

Manual-training rooms and sewing classes in more than 100 Detroit schools have been transformed into Santa Claus workshops where thousands of pupils are making all sorts of bright toys and articles of clothing for distribution by the Red Cross to the physically handicapped children in the hospitals and orphanages of Detroit, and Wayne county.

The smaller toys are to be given to individual children while the larger pieces will be the property of playrooms in the hospitals and institutions receiving them.

Detroit lays claim to a worth-while variety of toywork. The present system of making toys and turning them over to the American Red Cross for distribution to hospitals, orphanages, and institutions which care for children, dates from the

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TRACING SUPPLEMENT No. 75 THE INDUSTRIAL-ARTS MAGAZINE NOVEMBER, 1927

TRACING SUPPLEMENT No. 73.
THE INDUSTRIAL-ARTS MAGAZINE,
NOVEMBER, 1927.

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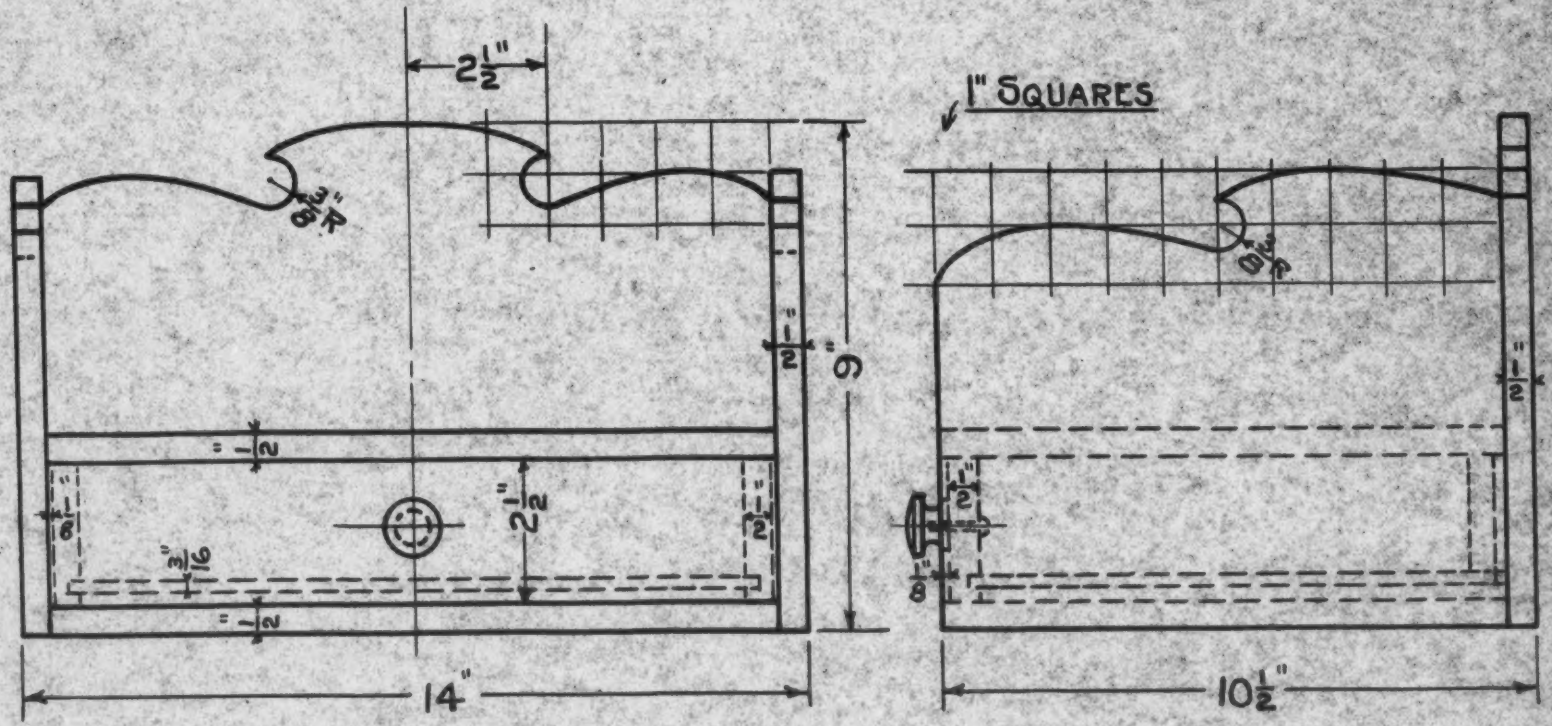

BOOK AND WRITING SUPPLIES CABINET

GE

Designed by Kenneth R. Le Voy, N. Syracuse, N. Y.

For Description See Page 429, Industrial-Arts Magazine, Nov., 1927.

TRACING SUPPLEMENT No. 76.
THE INDUSTRIAL-ARTS MAGAZINE
NOVEMBER, 1927.

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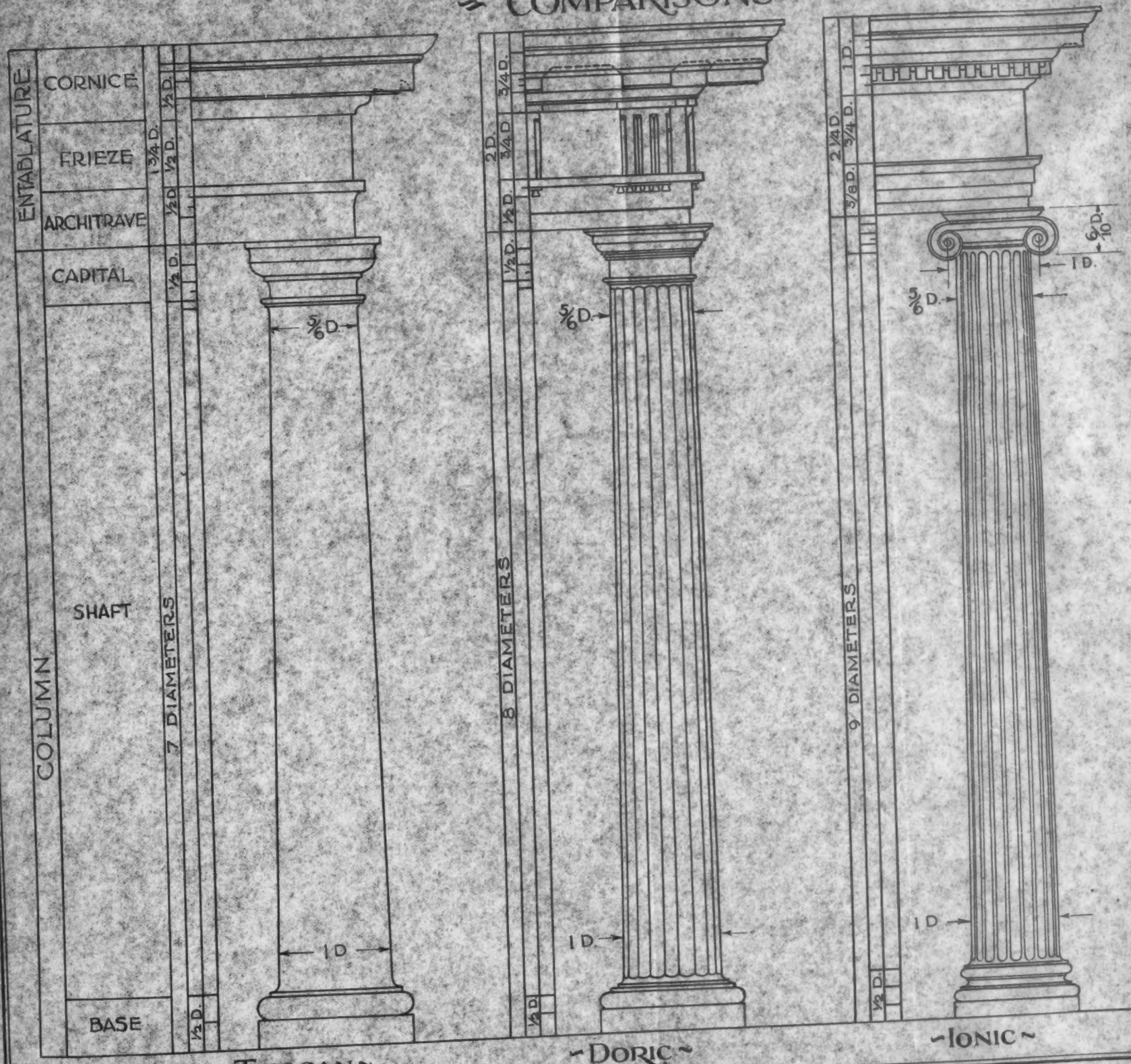

Architectural Orders, Louis H. Warren, Rye Country Day School, Rye, New York.

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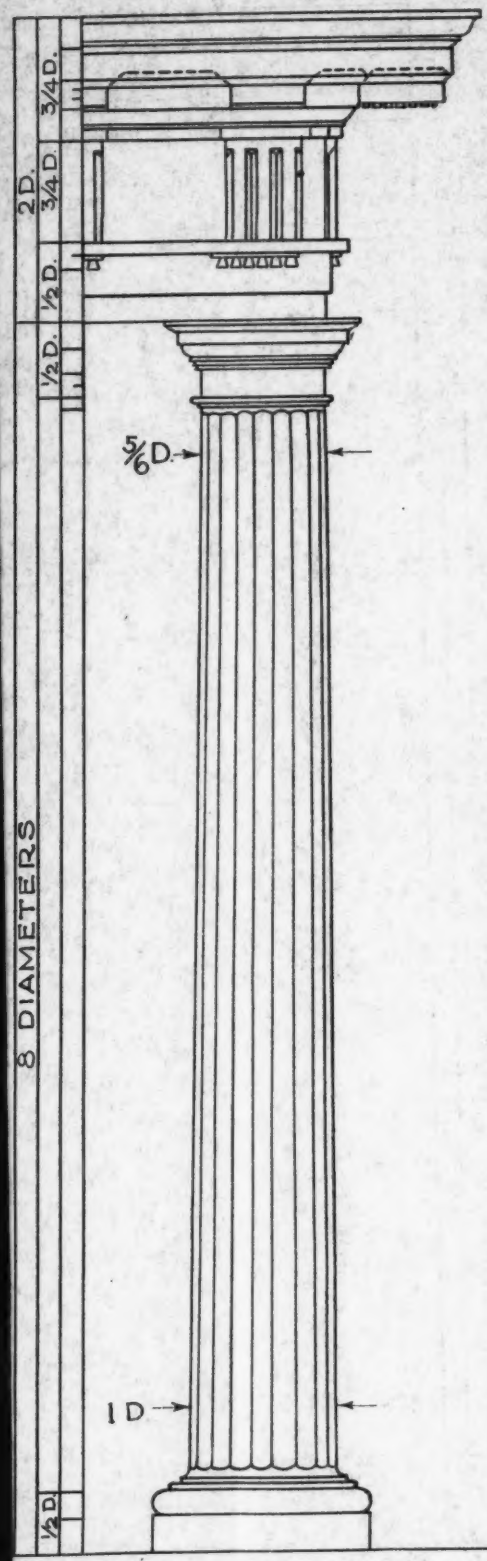

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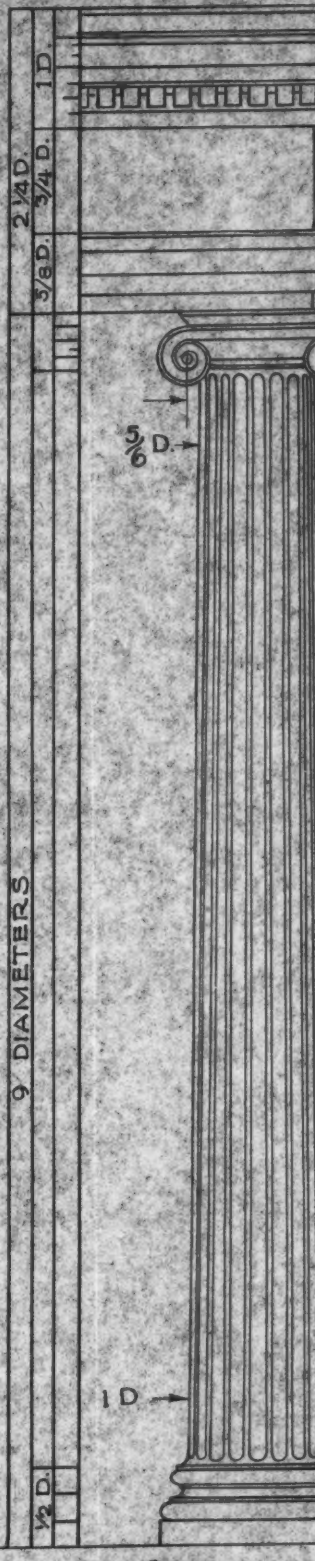

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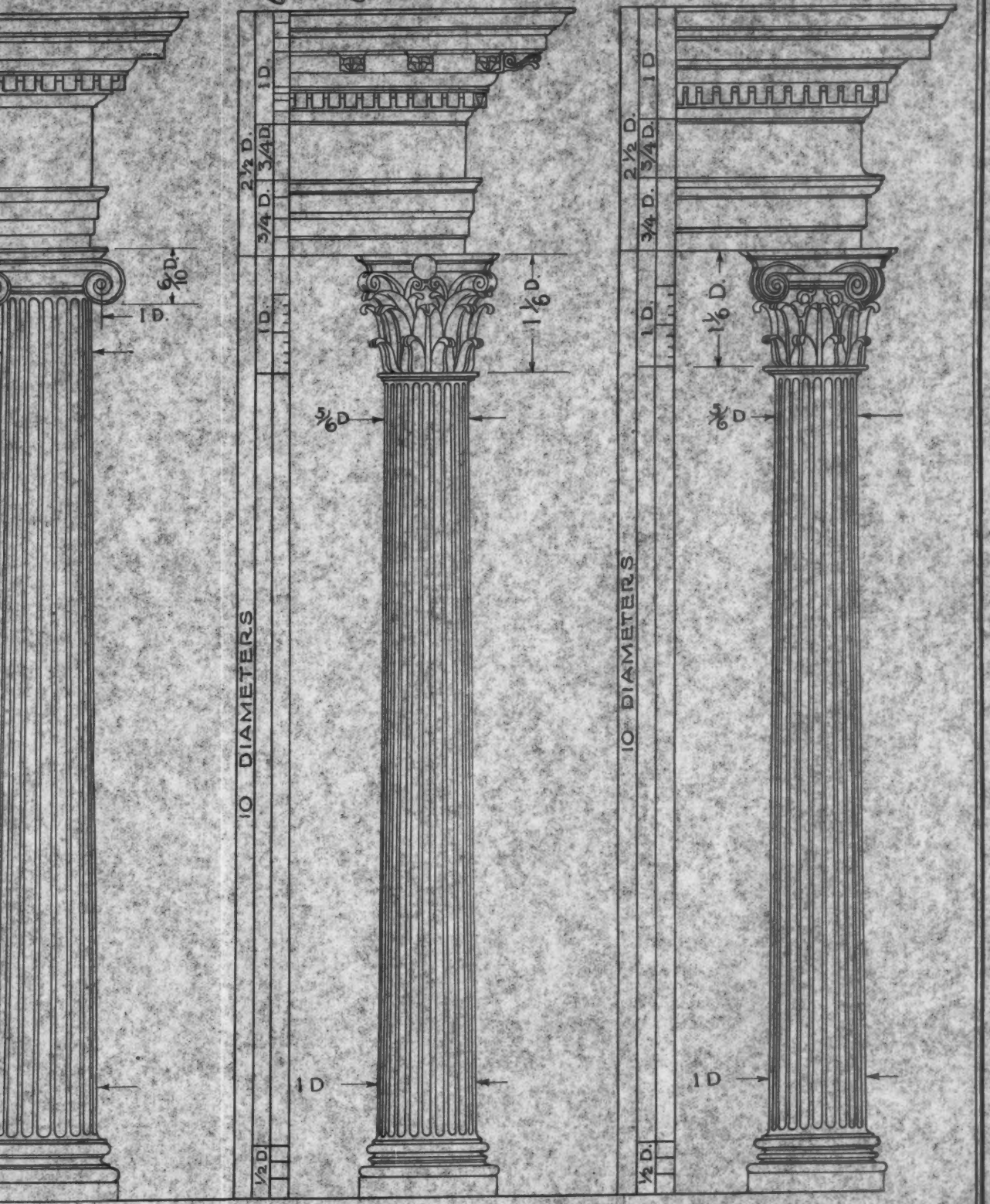
THE ORDERS



~NIC~ ~CORINTHIAN~ ~COMPOSITE~

For Description See Page 427, Industrial-Arts Magazine, Nov., 1927.

THE INDUSTRIAL-ARTS MAGAZINE,
TRACING SUPPLEMENT No. 77,
NOVEMBER, 1927.

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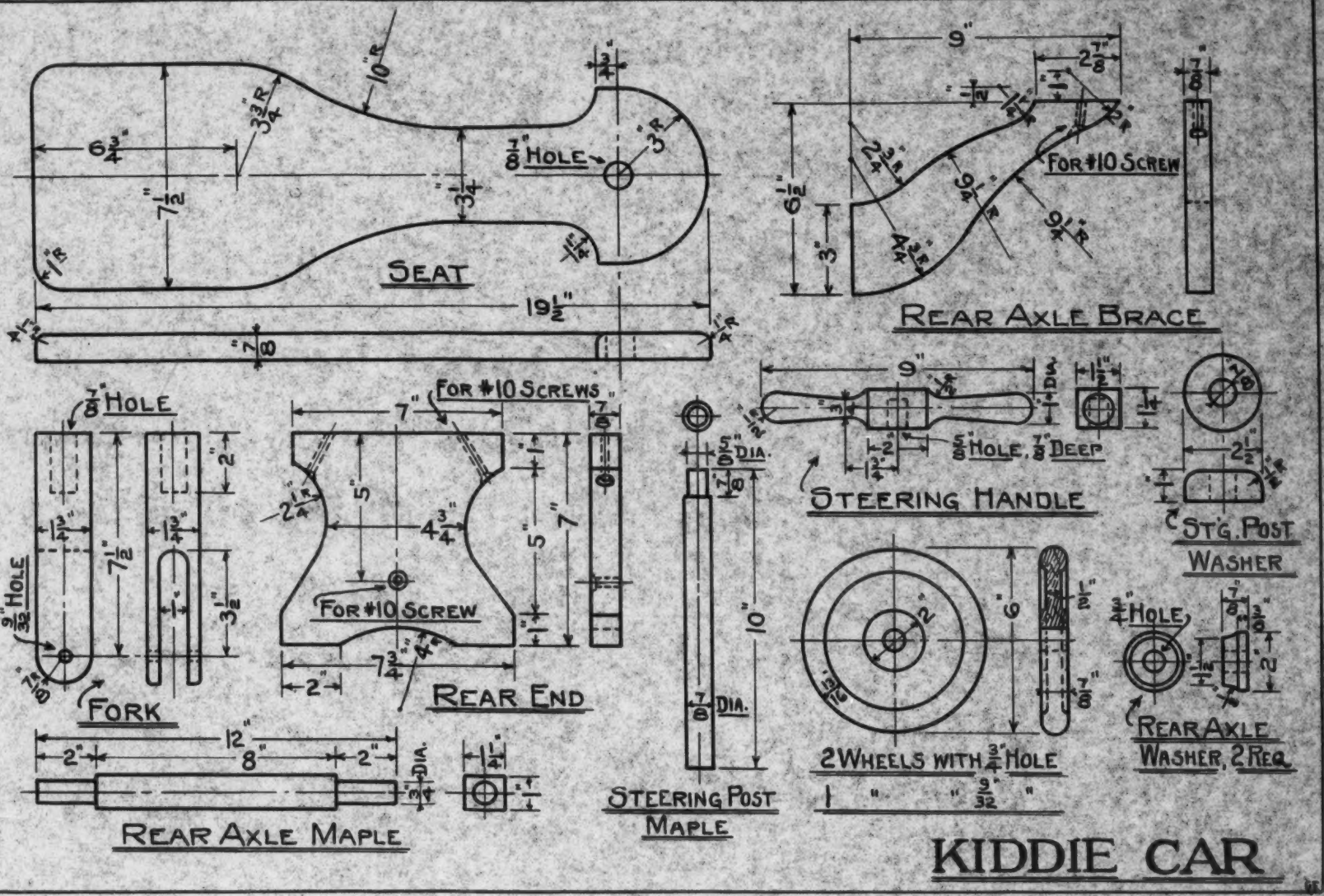


Designed by Stewart J. Shaw, Boston, Mass.

For Description See Page 424, Industrial-Arts Magazine, Nov., 1927.

close of the world war, and as might well be imagined was a more or less unorganized activity in the beginning.

The appeal to the sympathy of the pupils and teachers is perhaps the strongest single incentive to carry on the toy-making project. Two years ago a delegation of manual-training teachers visited the Michigan Children's Free Hospital. There it was possible for them to see and talk to the unfortunate children. To me it was a never-to-be-forgotten visit. There was Ferdinand whose right arm was stretched in a semi-vertical position on a steel frame, while his neck and shoulder were in a plaster cast. He remarked to me, "It's not so bad, I'll be out in two more weeks," but even while talking to me he was busily practicing with a ring-nose-clown, using his left hand which was capable of some freedom of movement. Every child greeted us with a smile. Even little Billy didn't more than whimper when he fell off the "shoot the chutes" when the steel straightening frames attached to both his little legs overbalanced him on the wild ride down the smooth slide. These pictures were inscribed on the minds of every teacher on that visiting day, and they needed no hypothetical situations in presenting the toymaking project to their pupils. Each teacher in his own way told the need of good toys, and explained carefully to the pupils their opportunity to give a real service. During the eight years in which I have been actively engaged in this toywork there has been not one objection brought to my attention. It has been a willing service of love on the part of 25,000 schoolgirls and schoolboys each year.

The detail plans for carrying on the work in the several shops can be understood very well by reading the extracts from the "Notes to Teachers" prepared with the help of the Red Cross committee.

"The committee on Red Cross toys wishes to bring the following suggestions to the attention of the principals and shop-teachers in elementary and intermediate schools:

"New toys may be seen by visiting the vocational office where it is planned to have on display the models which have been approved as suitable for this work. Any teacher having a new toy which is considered suitable is urged to bring it, together with the necessary pattern or drawing, to the vocational-education office, so that others may profit by the suggestion.

"It has been found by experience that certain types of toys are more suitable than others for children who are supposed to benefit from this work, therefore we believe it would be well to have all new models exhibited at the central office before making them in any quantity. A larger number of smaller toys are needed, therefore special attention should be given to the designing of small interesting toys for children who are confined to their beds in hospitals.

"It is suggested that a good way to make Red Cross toys would be to put the work on a cooperative basis. That is, instead of having each student attempt to make a complete toy, have each class make parts for a certain toy of which a number are needed. For example, the balancing barrister might be made by having the figure of the man cut out by the classes in coping-saw work, while the base and uprights could be made by classes using the planes. It is thought that this production method will result in a more uniform and better product, and that this method will give opportunity for teaching cooperation. It also will produce a greater number of toys in a shorter period of time.

"A few supplies are being bought by the Red Cross to supplement those regularly furnished by the board of education.

"The committee further recommends that the following standards of workmanship be maintained:

1. All lumber to be at least $\frac{5}{8}$-in. thick and dressed 4 sides.
2. Coping-saw work shall be carefully executed to a guide line. Except in difficult curves the use of the file is not recommended.
3. All parts should be sanded, and, in most cases, stained or painted *before assembling.*
4. All movable joints are to be secured with screws, rivets or cotter pins. Nails are not satisfactory. All movable parts are to operate freely.
5. Every toy should be inspected and tested before it is finally placed into the box for shipment.
6. If portions of the work are too difficult for the 5th and 6th grades, then the difficult portion should be turned over to the 7th and 8th grades. Good workmanship only is desired.
7. The same care should be taken in the manipulation of tools, in shop conduct, in planning the lesson for Junior Red Cross work as for any other lesson."

The distributing of toys is entirely in the hands of the Red Cross committee. The Red Cross truck calls at each school to pick up the toys between the 15th and 20th of December and takes them to a central loading station, usually a vacant store donated for the purpose. If possible, however, the schools deliver their own toys to this central loading station, thus saving trucking bills for the Red Cross. At this loading station the toys and garments are arranged for consignment to the institutions. The girls in sewing classes make hundreds of stockings which are then filled with candy, fruit, and small toys by volunteer workers. Some notion may be had of the immense quantities of materials produced in this way when one considers that there were more than 9,000 separate toys made last year.

It is found easy to develop the desire on the part of the boys to make good strong toys, because they are impressed with the idea that a broken toy will mean a broken heart. Therefore, the teacher is able to set up high standards of work. Each year I have examined these thousands of toys brought to the Red Cross station, and each year the workmanship is superior to that of the preceding year. This kind of toymaking never runs its course, and the instructors never need reviving. There is a continual incentive to develop new ideas and each year has brought forth several new types of toys. It might be well to state in this connection that no prizes nor competitive situations are set up to stimulate either quality or quantity. Toymaking is an accepted part of the course in manual training. The teachers do not look upon it as something extra. The boys work under directions, following job sheets or plans of work, which the class has had a part in preparing, just the same as for any other lesson. Each class contributes to the project that part which gives them desirable training. The 5th grade cuts out the toy elephants with coping saws; the sixth grade makes the bases, using the plane to accurately dress the boards to size; the class in woodturning supplies the small wheels made as an exercise in woodturning, and the 7th grade assembles and does the painting. In case of special decorations the work is often transferred to the art department.

The toymaking project is usually launched about the 1st of October, each class contributing about one half of their entire manual-arts time. Pupils are encouraged to make individual projects for their individual use, but many pupils voluntarily give all their time to the making of toys for the Red Cross. Through all of this work, careful instruction is given in the use of tools and materials, because the aim is good workmanship and so the work produces as byproducts an improved knowledge of tools and a real respect for what constitutes good workmanship.

The making of toys in cooperation with the Junior Red Cross has helped to vitalize the manual arts. The constructive work itself furnishes rich and varied opportunities to use tools and materials which is, of course, one of the important elements in manual arts. But of equal importance, and often a neglected phase, is the social and moral significance. It is certainly a worth-while educational activity when the boys of a city devote themselves in one great united effort to produce toys for those of their number who are less fortunate than themselves. Those of us who have watched these boys work with enthusiasm realize that they are receiving double value from their shopwork.

THE EDUCATIONAL VALUE OF PRINTING

Superintendents everywhere speak highly of the educative power of printing. Not only does it help the students taking the course, but the benefit goes out to the entire school system. Unlike other industrial subjects taught, the product of the school printshop, if prepared for educational purposes, easily finds its way into channels where it is bound to be helpful in the general educational scheme.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

"DID YOU GET ALL THE CARBON?"

Ray F. Kuns, Cincinnati, Ohio

"Why certainly, we got all the carbon. We took the head off and we scraped all the carbon out of it and then we took the carbon off the pistons and the tops of the valves. We even raised the valves in order to clean around them and when we had finished, every part was shining, it was so clean."

As far as the boys had gone, doubtlessly they had removed all the carbon. They did get all the carbon that was easily seen, but they did not remove as much as they might have if they had made the job a bit bigger and had really done a carbon-removing job.

Take for instance, the engine shown in Figure 1, with the head removed. The carbon in the combustion spaces is very evident. It is easily scraped away and wiped or blown out of the combustion space. The head can be turned over on the bench and it, too, is quickly cleaned. When the job is reassembled, a much quieter motor is the result. But all of the carbon has not been removed by this process.

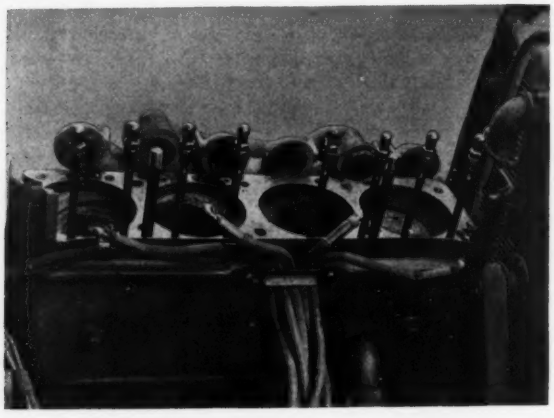


FIG. 1. AN ORDINARY CASE OF CARBON.

Look at the piston shown in Figure 2. This piston was cut in two in order to show some points at which ordinarily we do not expect to find carbon. The carbon at AA is easily reached for the cleaning operation. But look at the accumulation on the inside of the piston head. It is over a quarter of an inch thick at some places. Then look at the ring grooves. They are literally filled as indicated by the arrows at B. Next look at the side of the piston around the piston-pin hole. Here is a recessed portion of the piston and the accumulation of carbon is marked. The bright spot at E has been ground with carbon and minute scores are to be seen. Then look again at the points indicated by the arrows at D, where the carbon is "moist" and not so thick. All of the carbon on the inside of the piston is formed by the oil which "sizzles" against the inside of the hot head. Exactly two ounces of carbon were removed from those portions of this piston which ordinarily are not cleaned. Of course, this is an operation which requires the dismantling of the engine.

There are other points at which carbon collects. The engine may be sluggish owing to the fact that carbon has formed on the lower part of the valve head and around on the inside of the valve ports. Clean this out by scraping the ports and polishing the valves. Then go a bit farther, and take the carbon out of the exhaust pipe and the muffler pipe and if possible take the muffler apart and clean it. There are cases where carbon was found even in the intake manifold, thus decreasing the incoming charge. When *all* of the carbon really has been removed, you will be surprised at the "pep" the old bus shows.

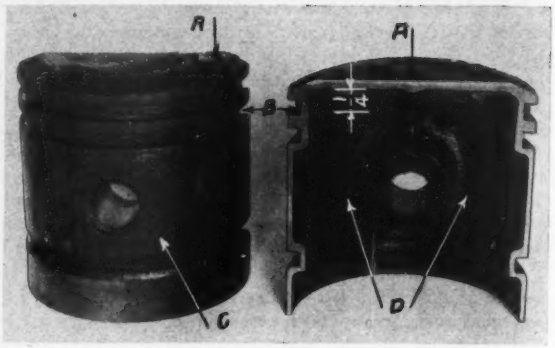


FIG. 2. THIS SHOWS SOME OF THE PLACES IN WHICH THE CARBON HIDES.

THE PRODUCTIVE SHOP

Stewart J. Shaw, Boston Continuation School, Boston, Mass.

(See Supplement No. 77)

In the woodworking department of the Boston Continuation School no project is attempted unless it has a real commercial value. Whether a boy is receiving his first lesson in woodworking or is about to graduate from the school, all of his work is on a project or some particular part of a project which eventually will be sold.

The large number of boys enrolled in the various departments of the school constitute a market waiting for the projects produced in the various shops. These are sold to pupils at the cost of materials, and to the public at a very slight profit above stock cost.

The projects for the most part are turned out in as large quantities as the instructor deems advisable, taking educational value and salability into consideration.

To illustrate our method, we will consider the ordinary "kiddie car," which we make in large quantities.

There probably is no project for a woodworking department of a continuation school, part-time school, or trade school, which offers such a wide variety of hand and machine operations as the kiddie car.

It is a project which may be made with very few machines; but if the school happens to be equipped with all of the more common machines, there is ample opportunity to use all of them to very good advantage. In the matter of jig and fixture work, which play such an important part in modern manufacturing, the project gives every opportunity to show the necessity of such devices.

The following is the program which was employed in making a lot of 100 of these kiddie cars in the woodworking department of the Boston Continuation School.

The woodworking department of this school is equipped as follows:

1 Circular saw	1 Cylinder plane
1 Band saw	1 Disc sander
1 Boring machine	2 Lathes
1 Buzz plane	1 Bench plane

1 Drum sander (made by the boys).

The department also has a very complete line of the more ordinary hand tools.

The first job is to get out the stock to make 100 seats. They are then marked out and band sawed to the proper shape and stacked in neat piles, ready for rounding the corners. The best side of each of these pieces is then chosen, and a ¼-in. 45-deg. chamfer is made all around the top of the seat. The edges of the chamfer are next taken off and the corners rounded with a spoke shave, after which the whole is sandpapered smooth, leaving a nice quarter-round edge around the top of the seat.

It is not necessary to finish all of the seats before starting some of the other parts. As a matter of fact, operations may be going forward on any number of different parts at the same time, without any regard to sequence. It is well, however, to plan this work so that when assembling is once started, the different parts will come along in such a manner that there will be no hold-up.

The next thing is to get out stock for 100 forks as shown in the drawing. The first operation is to bore a ⅜-in. hole 2 in. deep into one end of this stock. A jig can be devised to hold the pieces in the boring machine while they are being bored.

The next operation is to bore a 1-in. hole which forms the top part of the fork opening. The intervening stock is then cut out on the circular saw, a stop being fixed so that the saw cut is stopped when it has reached the 1-in. hole. The pieces are then marked on the fork end with a template, and then they are cut half round. In the center of this half round is bored a $\frac{5}{32}$-in. hole to admit a ¼ by 2-in. stove bolt which forms the front axle.

While these are being made, another crew of boys are turning out 100 steering posts.

These are glued into the fork, and after the glue has set, they are painted so as to be ready for assembling.

The lathe is then rigged for turning up one hundred handles. These, too, are painted, at once. After the paint has dried, the handles are placed in a V block and drilled with a ⅜-in. bit to fit the top end of the steering post.

The class groups are now divided into three different crews, each working on a different part of the rear end. One crew makes the back parts; another, the braces which are made by a process similar to making the seats, with the exception that the edges are sanded on a sand roll in the lathe; and the third crew gets out the axles which are made of 1¼ by 1-in. maple. The ¾ by 2-in. axle is cut on each end by a special cutter put in the head stock of the lathe, the wood being fed against the cutter through a jig, by hand pressure.

As soon as the back parts, braces, and seats are assembled, they should be painted. The stock for the wheels is next planed to thickness. Circles 6¼ in. in diameter are then drawn on the wood and these are cut out on the band saw. A $\frac{3}{16}$-in. hole is drilled in the center of each disc. They are then fastened to a face plate and turned to a 6-in. diameter. The edges are turned as shown in the drawing, after which they are sandpapered, and the center painted red. The rim is painted a pearl gray giving it the appearance of a rubber tire.

The waste stock left from the previous operations is used for making washers to hold the wheels on. These are first cut into 2¼-in. discs on the band saw. A ¾-in. hole is bored through the center so they will fit the axle. They are then placed on an arbor in the lathe and turned to 2-in. diameter, ⅞ in. thick, and shaped like a hub.

The washers for the steering posts are made in the same way, except that a ⅞-in. (instead of a ¾-in.) hole is bored and they are turned 2½-in. diameter, ⅞ in. thick, one edge to a ½-in. radius, quarter round.

Now each part has been made and painted, and all pieces are ready to be assembled. The axle is attached to the body, the wheels are placed on the axle, and the washers are slipped on and nailed in place, making sure that there is plenty of play for the wheels.

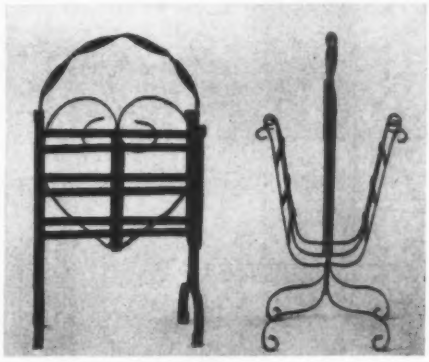
The steering post and fork are next inserted through the hole in the body and the washer slipped down in place, nailed, and the handle glued on. The car is now finished.

During the whole process, it is wise to have boys do the inspecting. It is up to the inspector to see that the things are done according to instructions. There should be an inspector appointed for each class, and a different one for each operation. This permits the distribution of a sense of responsibility among a larger number of boys.

MAGAZINE BASKET

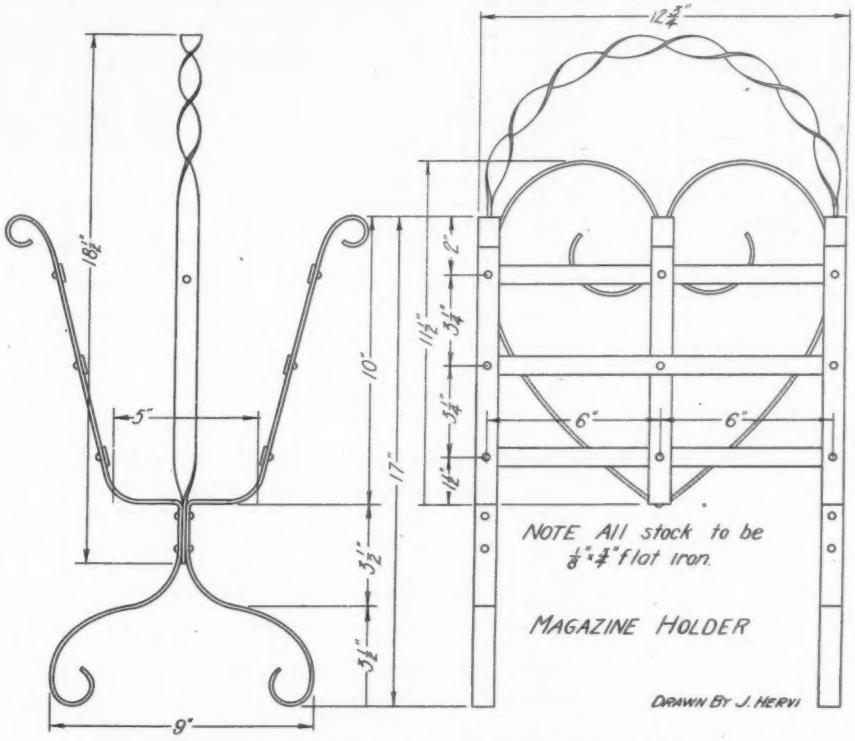
H. J. Wieland, Virginia, Minnesota

Wrought iron has been used as a decorative material for about 700 years. In the thirteenth and fourteenth centuries it was commonly used in Italy, Spain, and Germany. The work of this period was of great beauty and the artisans showed remarkable skill with the hammer. This was especially true of the early French smiths who were preeminent in ornamental ironwork. Ornamental ironwork is used today on lamps, pedestals, footstools, smoking stands, desks, and stretchers for tables. The accompanying illustrations show a very good problem in bent ironwork, one that can be used very satisfactorily by a ninth-grade student. The material may be spring steel for the legs and strap iron for the crosspieces or it may be made entirely of spring steel. One-eighth inch oval-head rivets are used. These are riveted without countersinking. The twist on the handle was used to give strength. A very beautiful finish can be applied with an air gun using, say, three colors, and blending them. Lacquer and bronze are used considerably for this kind of work.

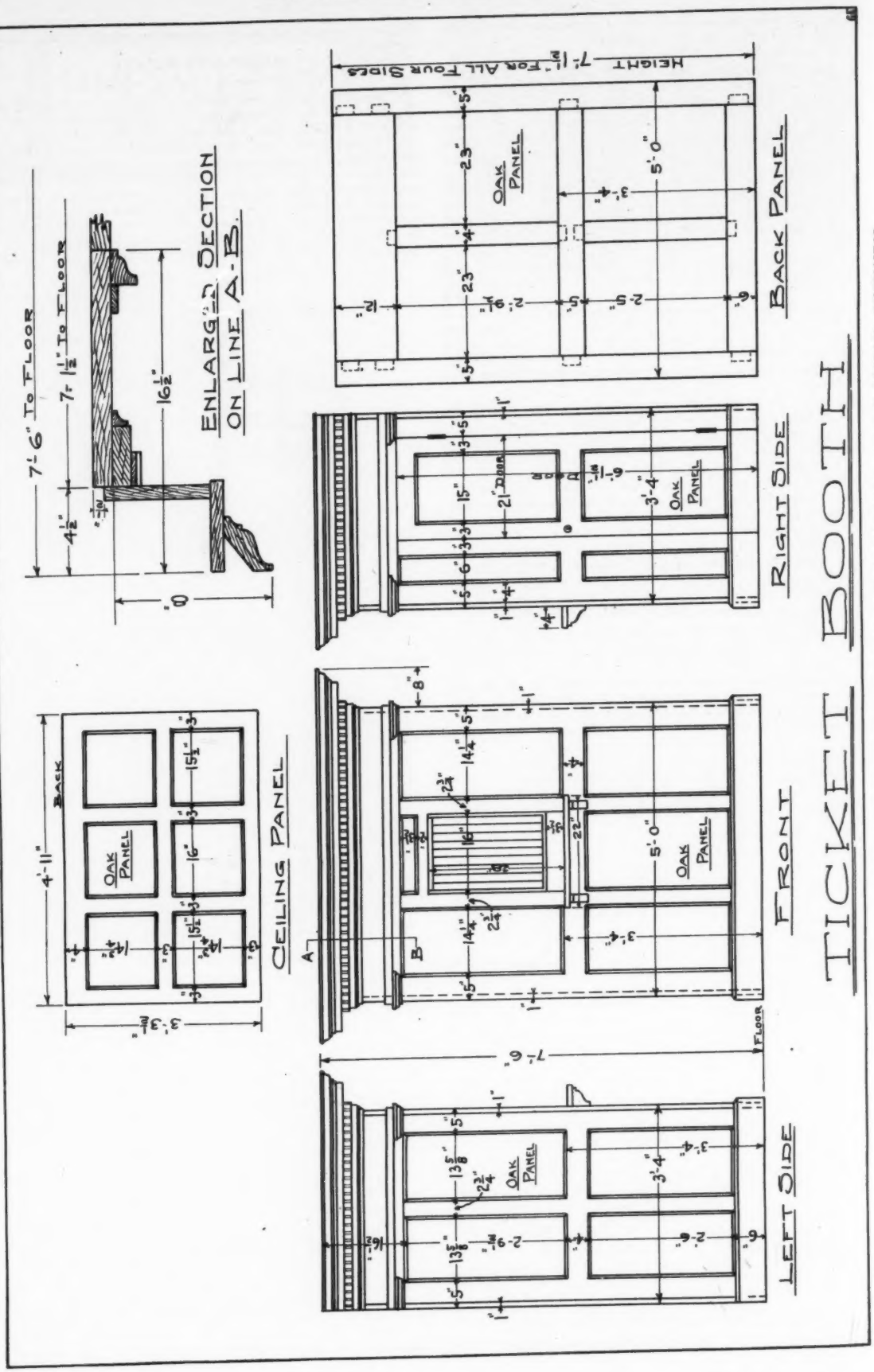


MAGAZINE HOLDER, DESIGNED BY H. J. WIELAND, VIRGINIA, MINN.

If the student prefers a natural metal finish he will find a good formula in the INDUSTRIAL-ARTS MAGAZINE of March, 1925, on page 110, by Mr. Thomas F. Googerty. The capacity of this magazine basket is about 16 average-size magazines.



MAGAZINE HOLDER, DESIGNED BY H. J. WIELAND, VIRGINIA, MINN.



TICKET BOOTH, DESIGNED BY STUDENTS OF THE JOLIET TOWNSHIP HIGH SCHOOL, JOLIET, ILL. MR. F. K. MUELLER, INSTRUCTOR.

A TICKET BOOTH

F. K. Mueller, Joliet Township High School, Joliet, Ill.

The accompanying cut illustrates a ticket booth, which was constructed by the class in vocational cabinetmaking of the Joliet Township High School, under the direction of Mr. F. K. Mueller, instructor in cabinetmaking. It occupies a position near the auditorium entrance.

The booth is constructed of quarter-sawed oak and is finished in golden oak. Each member of the class submitted an individual design and the one shown was chosen from the collection.

The actual work of building was divided among four boys, each taking a side and holding himself responsible for accuracy and good workmanship. The work consumed about fourteen weeks, or 210 clock hours per boy. In the construction, the cornice has been attached in such a manner that it may be removed separately as a unit.

The booth was completed in one semester, at an estimated cost of $65. The workmanship is considered excellent, and is a credit to the boys who designed and made it.

TICKET BOOTH, DESIGNED AND BUILT BY STUDENTS OF THE JOLIET TOWNSHIP HIGH SCHOOL, JOLIET, ILL. MR. F. K. MUELLER, INSTRUCTOR.

COMPARISONS OF THE ARCHITECTURAL ORDERS

Louis B. Warren, Director of Manual Arts, Rye Country Day Schools, Rye, N. Y.

(See Supplement No. 76.)

The five orders of architecture are basic in architectural design. Analysis of a great many classic examples show that the proportions of the column and entablature are constant. Various kinds and types of decoration may be used to embellish the frieze, architrave, cornice, or capital, but the underlying proportions must remain the same.

In the drawing, the five orders of architecture have been simplified, and the various parts have been dimensioned in terms of diameters. This gives a relative proportion that can be applied to columns of any height. For instance, if a column 14 ft. high of the Tuscan style is desired, the diameter of the column at the base will be 2 ft., while the capital must be 12 in. high. The entablature would be $1\frac{1}{4} \times 2$ ft. which equals $3\frac{1}{2}$ ft.

Some time ago, we had occasion to add a front porch to our house which is colonial in design. After consideration, we decided that the Ionic column best suited our needs. The porch as planned was to be twelve feet high. In ordering the columns, we specified 1 ft. 4 in. as the diameter of the base. After the alteration was completed, we frequently received commendation because of the gracefulness of the porch columns.

The column chart will be found to be very useful in designing stage settings for plays and church theatricals.

CUTTING COVES WITH A CIRCULAR SAW

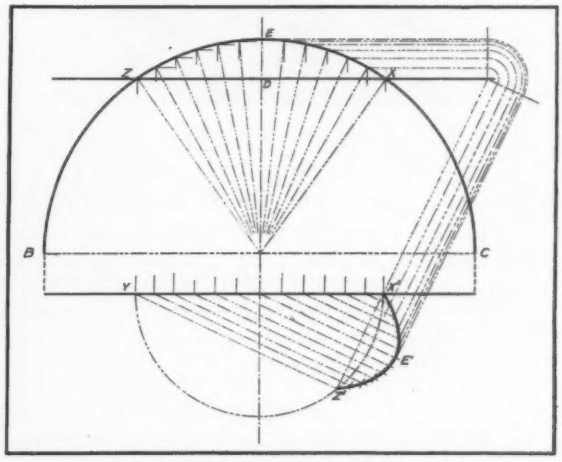
C. E. Turner, Ft. Collins, Colo.

The common method of cutting coves is that of running a series of parallel cuts with a circular saw, cutting out as much of the stock as possible. This requires a considerable amount of handwork with gouge, plane, and sandpaper, following the machine operation.

However, coves may be cut with a circular saw, leaving a smooth curve in various combinations of widths and depths. To do this the rip fence is set at an angle to the saw, the angle formed with the saw regulating the width of the cove for a given depth. The saw is set to a height of one-eighth inch above the table, and the stock run over it, following the fence. The saw is then raised an eighth of an inch and a second pass is made. This is repeated until the required depth is reached.

The accompanying drawing illustrates the method of finding the correct angle at which to set the fence for given dimensions of cut.

BC is the diameter of the saw which is being used. ZX is the saw table, and ED is the depth of the desired cut. Arc X'Z'Y is constructed with a diameter equal to ZX. The desired width of cut, X'Z', is laid off as a chord of this arc. Then the angle X'YZ' is the angle between the fence and the saw to give a cove with these axes.



CUTTING COVES WITH A CIRCULAR SAW. C. E. TURNER, FT. COLLINS, COLO.

This angle is transferred to the machine with a T bevel.

The development of the curve X'E'Z', which is the cross section of the cove, is an interesting and practical problem in shop drawing. The method of drawing this curve is illustrated. By varying the width and depth of cut a great variety of curves may be made, and the results checked in the shop.

HIGH-SCHOOL HOUSE DRAWING

H. H. Robinson, Augusta, Kansas

The drawing of a set of plates will, presumably, take a major part of the time devoted to any drawing course.

The drawing schedules for the individuals of the writer's classes vary considerably. The following, which is a typical list of plates for the first semester of house drawing, probably differs from the outline of instruction of most teachers in at least one point; there are but few detail plates.

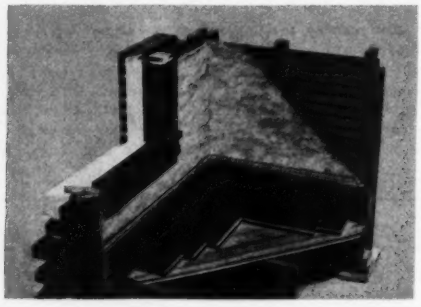
I. Lettering.
II. Cross section and isometric of the sill of a frame house. The drawing to be made from a model.
III. Cross section through a window frame and sash, drawn from a model.
IV. A cross section of a complete wall of a house taken through a window, drawn from a model.
V. Isometric of the corner of a brick-veneer house showing the construction and section through a window frame of the house, drawn from a model.
VI. Working drawing of the floor plan of a house, planned from a picture, or house catalogue.
VII. Working drawing of the foundation for the same house.
VIII. Front elevation and wall section for the same house.
IX. Side elevation of the same house.
X. Details of fireplace, cupboards, etc., to be built into the house.
XI. Perspective of the house.

Some might argue that more detail plates are necessary, but it must not be forgotten that the chief interests of a majority of the boys taking this work are the chief interests of future home owners. Some colleges have shown their approval of this particular course of study by granting advance engineering credit for it.

If the entire effort of the class is devoted to the completion of such a list of plates, it seems that the richest possibilities offered by

such a course are being disregarded. The writer is chiefly interested in these other possibilities of the course which are perhaps too frequently neglected.

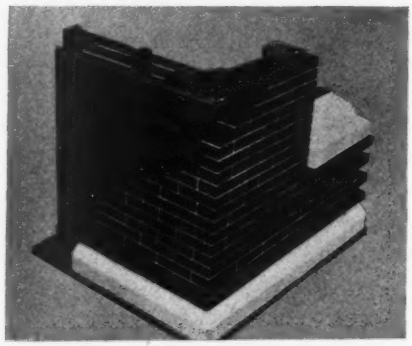
Each boy in my classes makes a special study of one or more topics relative to building. He then makes a report on what he has studied. The number of reports made by each boy depends upon the size of the class. Generally, a topic is assigned which has a special appeal to the boy to whom it is assigned. As sources for these studies, textbooks, reference books, magazine articles, and an abundance of advertising material are available. Architects, builders, and lumber dealers usually are glad to help the boy who appeals to them for assistance. Parts of some texts which possess sufficient value, are given out as general class assignments.



MODEL FOR ARCHITECTURAL-DRAFTING CLASSES, DESIGNED BY H. H. ROBINSON.

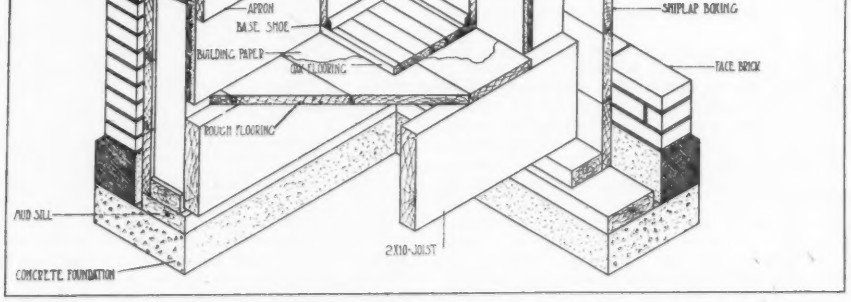
The following list of questions which were prepared for review purposes for the classes in first-semester house drawing perhaps will suggest other topics:

1. Compare the stiffness and strength of a 2 by 8-in. joist and a 2 by 10-in. joist.
2. Compare the stiffness and the amount of material in a floor with 2 by 8-in. joist, 8 in. on centers with a floor with 2 by 12-in. joist, 16 in. on centers.
3. Why is steel reinforcing used in concrete beams? Why is an I beam so strong for its weight?
4. What should be the size and spacing of a long-leaf-pine floor joist over a span of 16 ft.?
5. Tell about the early history of brick.
6. Tell about the modern manufacture of brick.
7. Define: Bond, stretcher, header, course, and joint.
8. Show by an elevation sketch what the following bonds are: Common, English, Flemish, garden.
9. Show by sketches how to lay six-, seven-, and eight-brick flues.
10. What do you think of flue lining?
11. Discuss the merits of an outside solid-brick wall.
12. Discuss the merits of a brick-veneer wall.
13. What do you think of a hollow-tile wall?
14. Discuss the merits of a stucco-covered frame wall.
15. Sketch a cross section through the sill of a frame house showing and naming all parts.
16. Sketch a cross-section view through the foundation and sill of a brick-veneer house.
17. Tell of the importance of building paper for a frame house.
18. Discuss methods of wall insulation.
19. What do you think of various kinds of wall board as compared with lath or plaster?
20. Discuss the merits of the following roofing materials as to cost, durability, fireproofness, appearance, and efficiency; wood shingles, asbestos-composition shingles, composition roofing, tile roof, slate roof.
21. What is meant by a square of roofing?
22. What are the two common grades of shingles?
23. Tell of the importance of the kind of nails used for roofing?
24. Discuss the merits of two good kinds of foundations.
25. How may a foundation be water-proofed?
26. What kind of soil is most likely to cause a wet basement?
27. Tell about the manufacture of Portland cement.
28. Discuss the qualifications for good sand and good rock.
29. What is a good concrete mixture for footings?
30. What is the most nearly waterproof mixture of concrete?
31. What are the most common door sizes?
32. How is the size of a window indicated?
33. What is the double-hung window, a casement window?
34. Sketch a cross section through the top of a window frame for a frame house.
35. Sketch a cross section through the side or bottom of the same window frame and name the parts.
36. What is a gable, gambrel, lean-to, and hip roof?
37. What is meant by one-third pitch, one-fourth pitch?
38. What is a seven-inch pitch?
39. What is a lap siding, drop siding?
40. How many board feet of 4-in. flooring will be required for a room 10 by 12 ft.?
41. How many board feet of 3-in. flooring will be required for a room 12 by 12 ft.?
42. What lines are used on an architectural drawing.



MODEL FOR ARCHITECTURAL-DRAFTING CLASSES, DESIGNED BY H. H. ROBINSON.

43. What kinds of woods are best for porch floors, inside floors, outside floors, joist and inside finish?
44. Discuss two different hot-water-supply systems for the home.
45. Enumerate the things that may increase or decrease the value of a lot for a residence.



DRAWING MADE FROM A MODEL IN THE ARCHITECTURAL-DRAFTING CLASS. H. H. ROBINSON, INSTRUCTOR.

46. Discuss the cost and merits of the following methods of heating a home: Pipeless furnace, piped furnace, steam, and hot water.
47. What should be done preliminary to the making of a working drawing?
48. Discuss the importance of specifications.
49. Define: Plan; elevation; detail.
50. How may the building of a home be financed?
51. What should be provided for in wiring a house?
52. Define: Plate, stud, sill, joist, rafter, run, span, pitch, boxing, sheathing stringer, threshold, casing, hip, valley, baseboard, base shoe, subfloor.

The foregoing list is not exhaustive. Many questions dealing with general practice were omitted because they were not of general interest.

While the work here suggested may seem to be a heavy schedule for a semester's work, it is being accomplished by boys who have had but one semester of general mechanical drawing as a prerequisite. The writer believes firmly in the words of W. E. Gladstone: "Believe me, when I tell you that thrift of time will repay you in after-life with a usury of profit beyond your most sanguine dreams and that waste of it will make you dwindle, alike in intellectual and moral stature, beyond your darkest reckonings." The best, then, that any teacher can do in the light of these words, is to assign to every boy a little more work than he can do easily. When the work is made interesting by careful planning, it is surprising how cheerfully and promptly the work is done.

BOOK AND WRITING-SUPPLY HOLDER

Kenneth R. La Voy, North Syracuse, N. Y.

(See Supplement No. 75)

An elementary project that involves drawer construction which can be used for the eighth grade, is here shown. The design is one that has been worked out by one of the boys in the shop, and the problem lends itself well to individual ideas in decoration.

The stand is planned for use on the boy's study table at home and has a very popular appeal. The tool processes and operations make it also worth while from the standpoint of the instructor. Drawer construction may be taught without the necessity of building tables which is often made difficult by the limited amount of material at the command of the instructor.

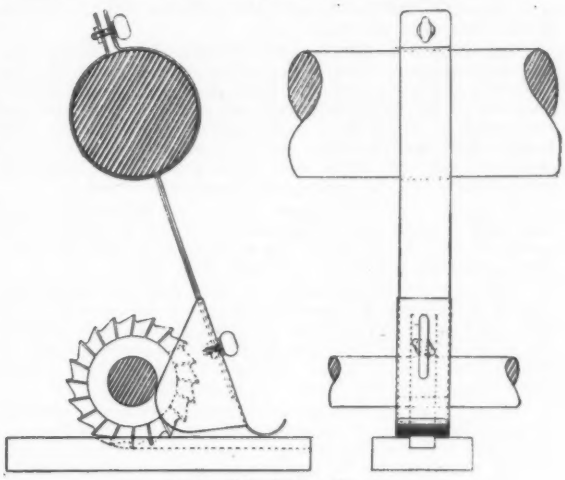
This problem also is a good medium for the boys to become acquainted with the new lacquer finishes which are rapidly becoming popular in the manual-training shops.

SAFETY IN SCHOOL WORKSHOPS

Herbert L. Reid, Safety Inspector

Because it is impossible for an instructor to watch all of his pupils at one time, every possible safety precaution should be taken to provide safe working conditions in school workshops, says H. L. Reid, in the "Industrial Hygiene Bulletin," published by the State Department of Labor, Albany, N. Y.

It is also important that the pupils be taught the safe manner in which to operate machines and to use hand tools, for they do not realize the danger of a moving part or the sharpness of an edged tool. An accident recently occurred to a boy in one of the workshops in a school. Why did it happen? The boy was doing a piece of work on a milling machine. While the instructor stood by the machine, the boy, with his finger, brushed away some chips of metal from in front of the revolving cutter. He was warned by the instructor that it was a very dangerous practice to use the fingers to remove the chips. (A brush should be used for this purpose.) After the instructor walked away, the pupil again attempted to remove the chips in the same unsafe manner, and his index finger was caught by the revolving cutter and so mangled that it had to be amputated at the knuckle. A similar accident occurred in another school which resulted in the loss of the first joint of the index finger.



Guard for Milling Machine cutter

All milling machines should be provided with a guard for the point of contact between the cutter and the stock.

The accompanying drawing shows a guard for this purpose.

The foregoing accident would not have occurred if the pupil had obeyed instructions. How often do we all disregard instructions and warnings relating to safety! That is one of the reasons why a guard should be provided and used wherever possible.

An instructor in a woodworking shop stated that no accident would occur on a circular saw in his room even if the saw was unguarded for he instructed all the pupils to remove their hands from the stock when they were within three inches of the saw and to use a "push stick" or some other means to finish the cut. Sometimes a pupil will disregard these instructions and there will be an accident which probably would never have occurred if a guard had been used.

A HANDY ALPHABET FOR POSTER WORK. DESIGNED BY BEN AND ED HUNT, MILWAUKEE, WIS.

When schools are being equipped, the machines should be provided with the most approved type of guards for in this manner the pupils of today who become the workers of tomorrow will then be accustomed to the use of the proper safety devices.

Therefore, they will use the guards provided, and not put them aside as is so often done in industrial plants today.

PRINTING YOUR OWN DRESSES

Marie Downs Wilson, U. S. Naval Station, Cavite, P. I.

One of the most delightful as well as practical problems in costume design is the printed gown. The method of printing is simple and the result most satisfying.

The materials needed are a piece of white cloth, preferably voile, pongee, or organdy or linen, to be used for the dress; a set of school dyes, or if dyes are not available, a set of oil paints; a set of block prints which you yourself have made, and a blotter. Make your own block prints by cutting shapes in the ends of spools and corks. The wooden spools lend themselves readily to many flower shapes which may be made by cutting the edges of the spools with a sharp knife or razor blade. Do the printing on a broad table or desk.

Under the cloth to be printed, place several thicknesses of newspaper and, if convenient, a large desk blotter over the papers. The reason for using the blotter is that it helps absorb any extra paint that may seep through to the wrong side of the goods.

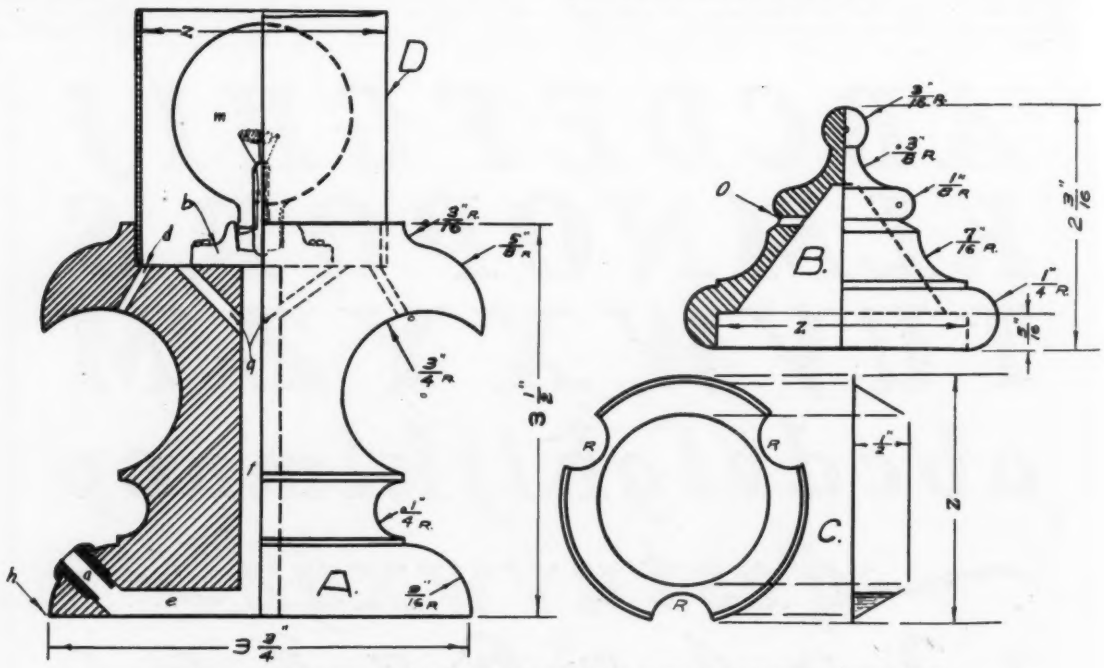
Cut four or five pads about one inch square of cheese cloth, place in a paint tray and cover with the dye to be used. Press the block print on the pad and then press firmly on the dress goods to be printed. Have a trial cloth for the first few efforts, since the first prints are likely to be dim. Keep one block or one spool for each separate color to be used to avoid cloudy color schemes.

If circles are used exclusively, be careful to have a noticeable difference in the size of the circles. Thus, circles of the size of a half dollar, the twenty-five-cent piece, and the ten-cent piece, may be used to give variety. Try a number of group designs on drawing paper first. Then choose the best design for the costume. A pleasing result may be obtained if the group designs are joined together with a thin line made free-hand with the paint brush.

Instead of dyes, oil paints may be used exclusively, providing they are mixed with turpentine to a consistency which will adhere readily to the wood or cork. If paints are used, the little pads are unnecessary since the color may be painted directly on the spool or cork with the paint brush. In order to set the colors after the design has been completed, the cloth should be pressed with a hot iron after the colors have dried. If a damp cloth is placed between the cloth and the hot iron, the steam will help to set the colors a little more permanently. Then the dress can be laundered without fear that the colors will disappear.

A HAND-PAINTED DRESS OF WHITE ORGANDY. THE DESIGN WAS PRINTED FROM SPOOLS AND CORKS ARRANGED TO FORM FLOWER SHAPES.

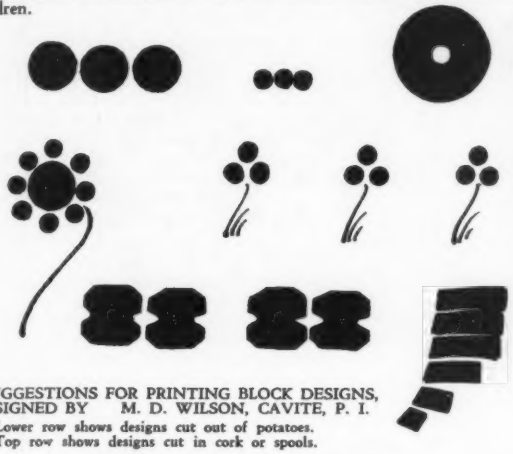
The printed design shown on the dress in the illustration was made entirely with blocks cut out of corks, and the ends of spools which had been cut to form flower shapes. The designs were joined together by thin lines made with the brush. If the pupil does not wish an all-over design, very attractive border designs for the tops of wide hems and the ends of scarfs and sashes may be printed instead. For summer wear the printed scarf of bright voile makes a delightful and inexpensive problem.



TORCHIERE AND PERFUME VAPORIZER, DESIGNED BY CARL A. MacMILLER, HIBBING, MINN.

A.—Base, B.—Cap, C.—Vaporizing Pan, D.—Glass Tube.
a—Rubber Bushing, b—Candelabra-base Socket, m—Candelabra-base Bulb, e, f, g—Passage for Cord, d—Air inlet, ⅛" drill, 1½" apart, h—Green Felt glued to bottom, O—Air Outlets in Cap, ⅛" drill, ¾" apart, R—By pass for rising air in vaporizing pan, Z—Must be same on B, C, and D, and is dependent on size of tube available.

If animal shapes instead of flower prints are cut, they may be used to great advantage on soft white muslin dresses for very small children.



SUGGESTIONS FOR PRINTING BLOCK DESIGNS, DESIGNED BY M. D. WILSON, CAVITE, P. I.
Lower row shows designs cut out of potatoes.
Top row shows designs cut in cork or spools.

PLYWOOD CONTEST CLOSES.

In the March issue of the *Industrial-Arts Magazine*, a contest for drawings of plywood projects was announced by the Algoma Panel Co. Plywood has become so firmly established in the woodworking industries that the boy in the school shop also should have the opportunity to learn something about this most adaptable product. The wide-spread interest which was displayed in the contest shows that plywood even now is rather popular among teachers of woodwork. When the contest closed on October 1, it was found that about 400 teachers had submitted over 700 drawings.

The 100 best projects will now have to be selected by the following judges: Geo. M. Brace, director of manual training and vocational work, St. Paul, Minn.; Elmer W. Christy, director of industrial arts, Cincinnati, Ohio; Harry E. Wood, director of manual training, Indianapolis, Ind.; and William E. Perry, general manager, Algoma Panel Co., Algoma, Wis.

Thirty cash prizes varying from $5 to $100 each will be awarded to the successful contestants. There also will be 70 honorable mentions.

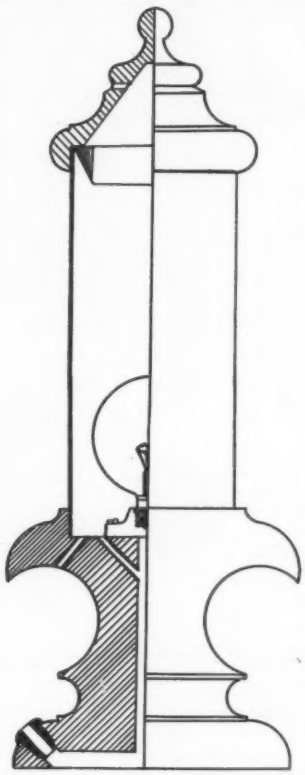
After the judges have made their final decision, the hundred drawings with complete working information will be printed in an attractive manual under the title "Plywood Projects." This book will be divided into three sections. The first will contain work suitable for elementary-school pupils, the second embraces the junior-high-school projects, and the third embodies advanced work for senior-high-school students.

Each contestant who has submitted one or more drawings, will be given a copy of "Plywood Projects."

ELECTRIC TORCHIER AND PERFUME VAPORIZER

Carl A. MacMiller, Hibbing, Minn.

The torchier described herewith, is one that can be made in practically any combination shop of a junior high school. It includes some of the following lines of work:



TORCHIER AND PERFUME VAPORIZER, DESIGNED BY CARL A. MacMILLER, HIBBING, MINN.

1. *Woodturning.* Making the base and the tip. This includes chuck and face-plate work and a variety of other lathe operations.

2. *Electrical Work.* Study of incandescent light; sizes of sockets and bulb bases and their names and uses; meaning of circuit and necessity of it; construction, wiring and possible repair of plug and socket; insulation of parts in general, and reasons.

3. *Sheet Metal.* Both the base and the tip can be made out of sheet metal either spun, or if the design is changed a trifle it may be raised with a hammer. The little vaporizing pan will have to be made by slightly raising a piece of sheet metal, preferably brass.

4. *Physics.* Ventilation of the torchier and the purpose and necessity thereof; air currents and their causes.

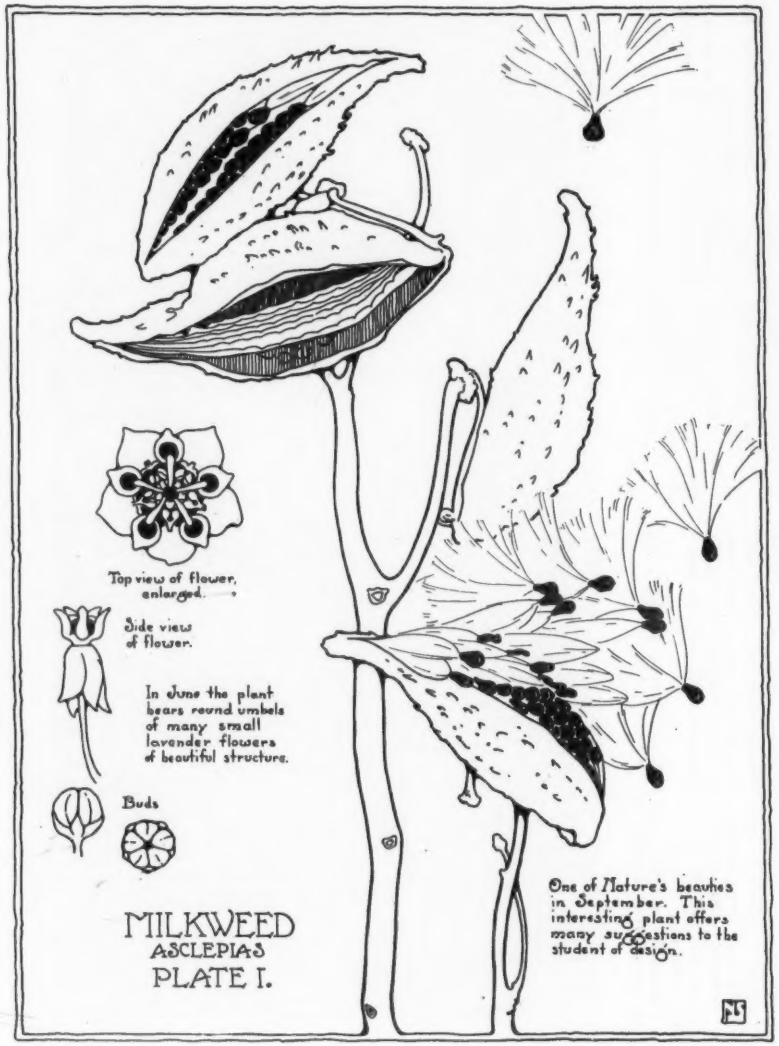
5. *Woodfinishing.* The finishing of the base and tip if made of wood as shown in the drawing; amount of heat certain finishes will stand; blending of finish on wood parts with shade to be used.

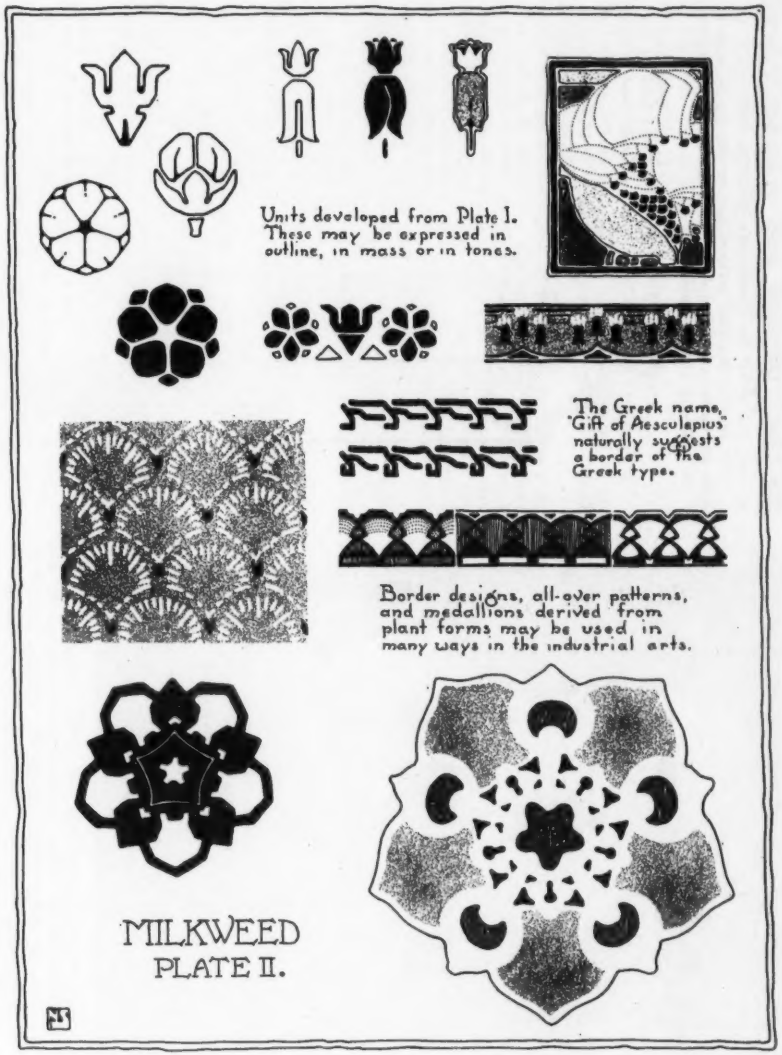
6. *Glazing.* Cutting and fitting of glass tube to fit base and tip; study of proportion, as for instance, the diameter to the height of the tube.

7. *Art and Design.* Decorating the sleeve that serves as a shade; purpose of torchier and possible color scheme in connection with other fixtures in the same room.

8. *Furniture.* Painting on glass; effect of heat on finish; proper design.

GERMAN CHEST, EARLY SIXTEENTH CENTURY.
Photograph by The Metropolitan Museum of Art.


Top view of flower, enlarged.
Side view of flower.
In June the plant bears round umbels of many small lavender flowers of beautiful structure.
Buds
One of Nature's beauties in September. This interesting plant offers many suggestions to the student of design.
MILKWEED
ASCLEPIAS
PLATE I.


Units developed from Plate I. These may be expressed in outline, in mass or in tones.
The Greek name, "Gift of Aesculapius" naturally suggests a border of the Greek type.
Border designs, all-over patterns, and medallions derived from plant forms may be used in many ways in the industrial arts.
MILKWEED
PLATE II.

WILD FLOWER DESIGNS. NETTIE S. SMITH, SMITH CENTER, KANS.

PICTURE FRAMING SIMPLIFIED

Funcke A. Carlsen, Head of Industrial Arts, Harrison School, Lakewood, Ohio

Picture framing is an interesting and educational problem which can be taught to a seventh-grade class, if the instructor provides the necessary equipment. Almost every boy will bring a picture to be framed. This will aid in creating an interest in the industrial-arts department on the part of the parents. The broken glass which has been collected around the school and home not only will be disposed of, but will be put to a profitable use. The necessary equipment can be made easily by the shop-teacher or some advanced student in the industrial-arts department.

The Picture-Framing Vise

The material used will be: Parts of two hand screws, and a block of hardwood 1¾ by 12 by 12 in. Frequently, one or two broken hand screws may be found in the shop, otherwise parts of two clamps must be used. Cut a rabbet 4 in. wide and ⅜ in. deep along the two sides of the 1¾ by 12 by 12-in. block as is shown in Figure 1. It is advisable to put two pieces of metal in the corner where the nailing will be done, but this is not necessary.

Drill holes for the two screws and nuts of the clamp, so that the jaws are flush with the raised surface of the block. When this is completed, plug the holes in which the nuts have been placed, then sand and shellac the entire vise.

A combination saw and vice as is shown in Figure 2 will be a little more convenient, but will not be more serviceable than a miter saw and the framing vise described in the foregoing.

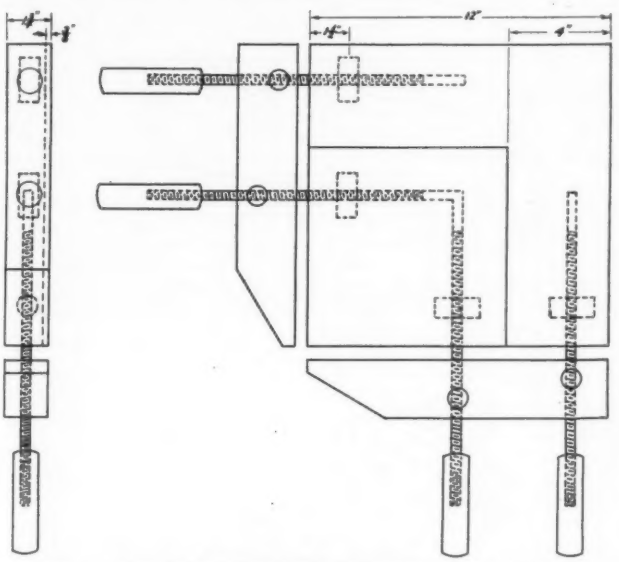


FIG. 1. PICTURE FRAMING VISE, DESIGNED BY F. A. CARLSEN, LAKEWOOD, OHIO.

The Glass-Cutting Board

Glass cutting is not difficult, if one has the proper cutting board. Figure 3 shows a board which can be made in the school shop. It may be made of any well-seasoned wood, but hardwood holds its shape better and is, therefore, preferable.

Four slats are screwed on the bottom to keep the board firm and level. The square pieces of molding along the two edges extend

FIG. 3. THE GLASS-CUTTING BOARD, DESIGNED BY F. A. CARLSEN.

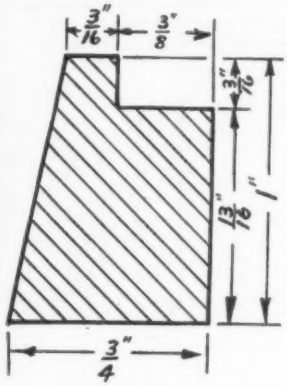


FIG. 4. PICTURE-FRAME MOLDING, DESIGNED BY F. A. CARLSEN.

⅛ in. above the top to accommodate double-strength glass. The screw at the end of the T square is used to fasten the T square down to hold any piece of irregular glass so that the boy can make a straight cut. Lay out 1-in. squares over the surface of the cutting board, to assist in measurements and then shellac the board well.

Cutting the Molding

If a power saw is available, several hundred feet of molding can be cut in a short time. Odd sizes and short pieces of stock can be cut into molding. The size of the molding, kind of material used, and style of molding is optional. If a polychrome finish is to be put on, softwood is preferable.

The dimensions given in Figure 4 make a neat frame for most pictures which will be framed in the shop. The bevel on the top may be cut on a saw table which can be tilted; or it may be cut on any saw by fastening a beveled board to the fence. The roughness can be taken off with a plane or power jointer.

Finished molding of any style or color may be purchased at the local furniture store or from a photographer.

Cutting and Nailing the Miter

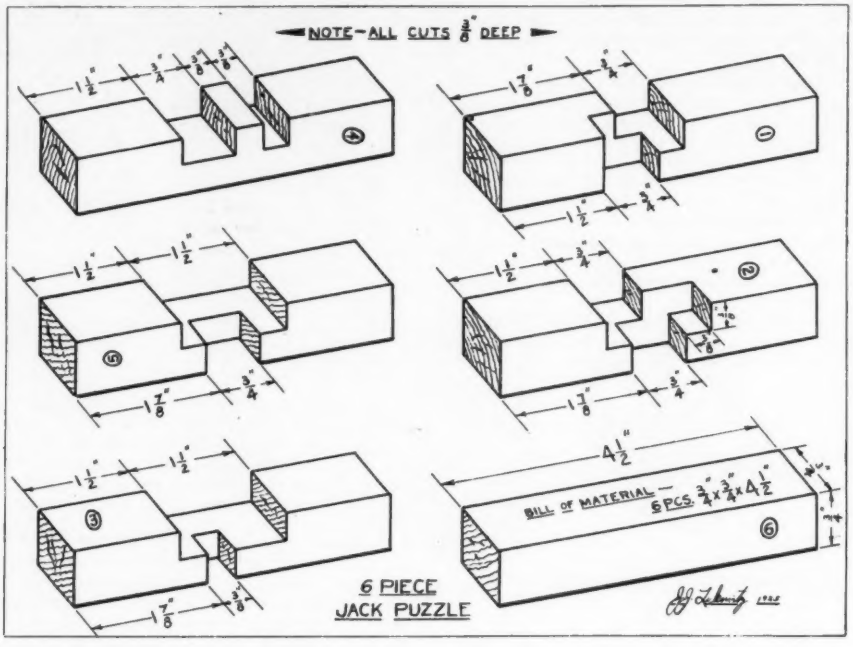
The miter may be cut with a miter saw or layed out and cut with a backsaw. Joints that are well nailed and glued will hold indefinitely. Either cold or hot glue may be used. Nail the miter with as large a brad as the molding will permit. Drive two brads from the top of the frame and one from the side in such a way that the brad driven from the side will go between the other two brads. If hardwood is used, it may be necessary to drill a small hole through the first piece.

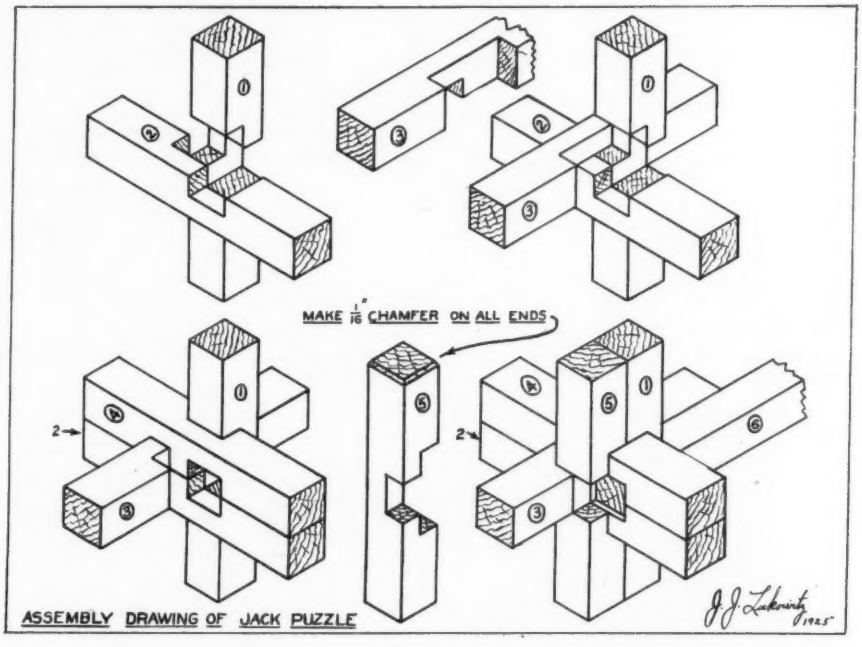
FIG. 2. THE PICTURE-FRAMING VISE IN USE.

TEST ON SAWING, PLANING, MEASURING, AND CHISELING

Jos. J. Lukowitz, Milwaukee, Wis.

The accompanying drawings illustrate a puzzle which may help an instructor to solve the puzzle of what problem to give the eighth grade when there are but a few weeks of school left for them.



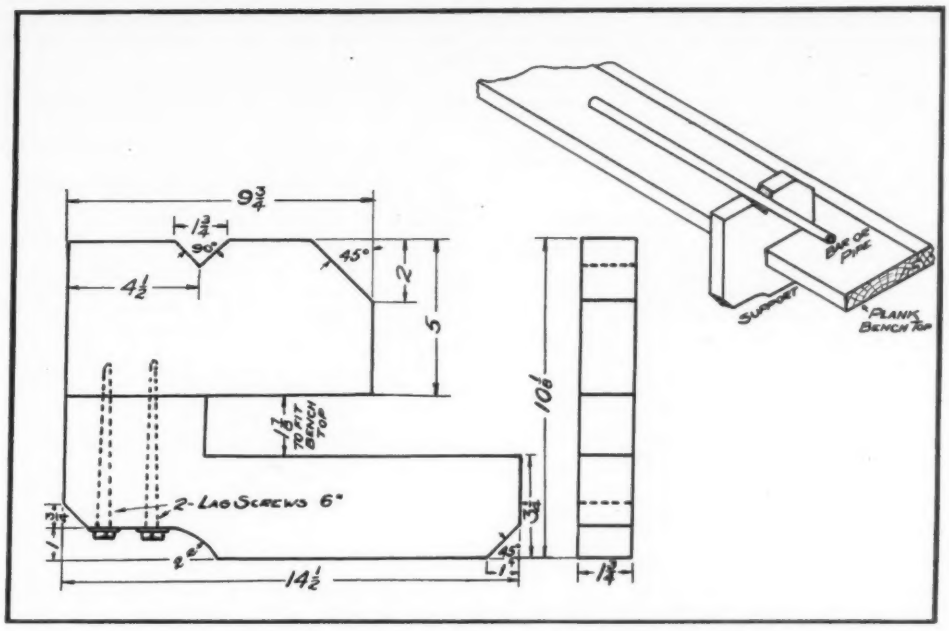


As seen on the drawings it requires very little material, yet it is rich in educational content, being a thought-provoking problem with self-contained interest.

I provide each boy with a mimeographed copy of the puzzle drawing and after a general interpretation of the drawing by the class, I give a demonstration by making one of the six sticks required. Each boy is then required to work out his own salvation as far as the reading of the drawing and the execution of the work are concerned. The boys take pride in working from a drawing for they are satisfying their imitative instinct following as it were in the footsteps of the admired blue-print workman. This drawing has been made as simple and as clear as possible so as not to discourage this most valuable basic educational instinct. These boys are taking their first lessons in reading the universal language—mechanical drawing.

The words, "what shall I do next?" are still ringing in my ears as I write these lines but since the introduction of this problem to my classes, I have more time for individual help; for each boy has his specific directions before him.

A drawing, clear, concise, and within the easy comprehension of the boys leaves the instructor more time to teach and does not compel him to answer the great chorus, "what shall I do next?" so often. Direct answering of "what shall I do next?" is pedagogically unsound and it tends to make the pupils entirely dependent on the instructor.



PIPE AND BAR SUPPORT, DESIGNED BY D. S. HARDING, WYNCOTE, PA.

PIPE AND BAR SUPPORT

Donald S. Harding, Department of Manual Arts, Cheltenham Twp. High School, Wyncote, Pa.

During the last year we did a great deal of pipe cutting and threading in our general metal shop. Part of this work was for the supports for twenty-seven tables for our mechanical-drafting department. These supports were of 1¼-in. iron pipe.

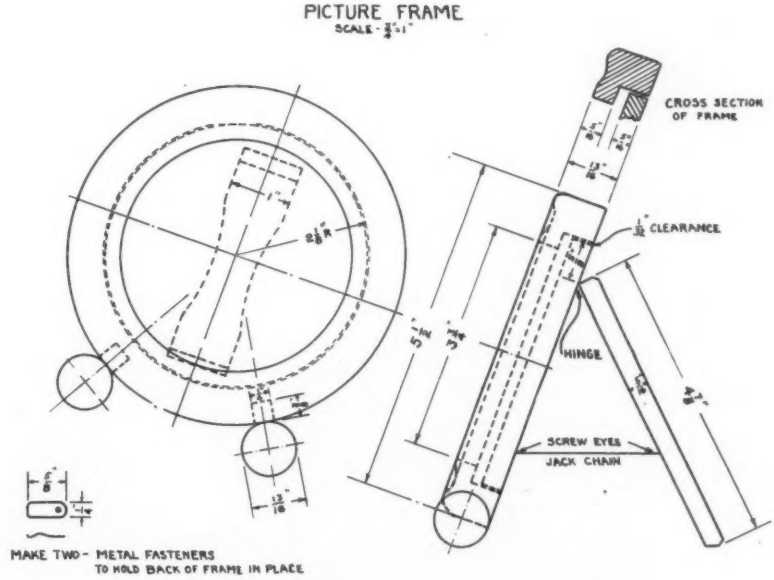
The pipe was purchased in standard lengths. To hold it properly for cutting and threading, we constructed a long bench, at one end of which we placed a large machinist's vise which is equipped with pipe jaws.

The vise supports and holds one end of the stock, but the remaining length must be supported by some other means. To do this, we constructed several of the supports illustrated herewith. They were made of 1¾-in. maple. The slot allows them to be placed over the edge of the bench and to be shifted to any desired position. We found them to answer the purpose very well.

PICTURE FRAME

Frank W. Dejmek, Marinette Vocational School, Marinette, Wis.

The picture frame shown in the drawing is a practical problem for the boy who is interested in lathe work. The suggested design makes an attractive frame.



PICTURE FRAME, DESIGNED BY FRANK W. DEJMEK.

Allow three sixteenths of an inch for the thickness of the glass, picture and felt. The felt should be glued to the back. Its purpose is to form a cushion between the back and picture.

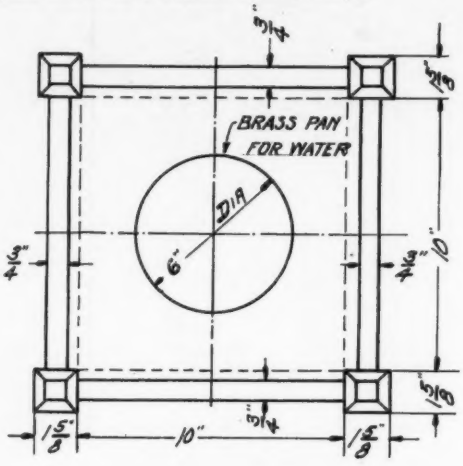
Make two metal fasteners to hold the back in place. These should be fastened to the frame with screws in such a way that they may be turned out of the way when the back is to be removed.

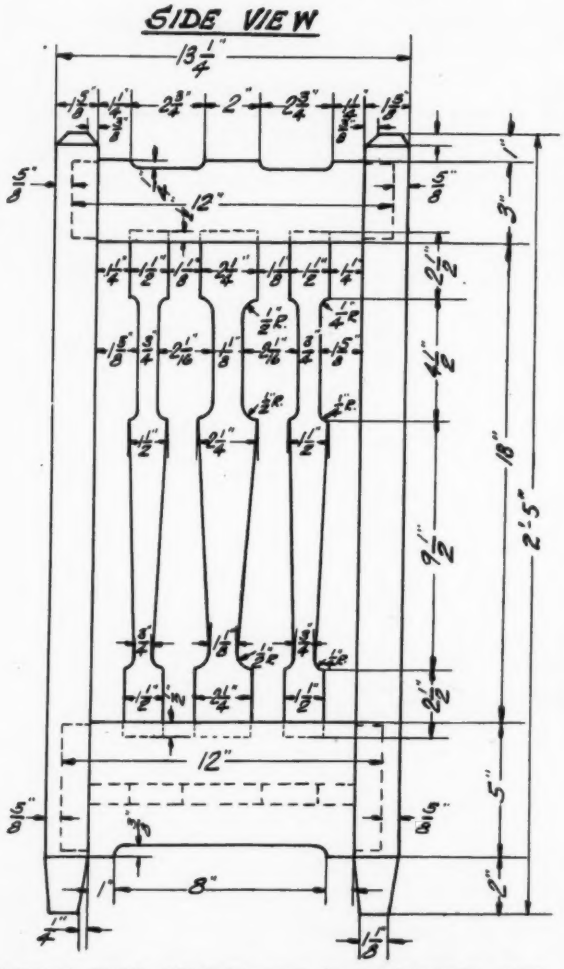
UMBRELLA STAND

F. W. Ziegenhagen, Boys' Technical High School, Milwaukee, Wis.

The unbrella-stand drawing shown is a good project in first-semester cabinetmaking. There are opportunities for individuality in the design of the rails and of the slats.

The construction is not difficult, being of the mortise-and-tenon type. Since the details are shown in the drawing, a few suggestions together with a bill of materials should be ample.





UMBRELLA STAND, DESIGNED BY F. W. ZIEGENHAGEN, BOYS' TECHNICAL HIGH SCHOOL, MILWAUKEE, WIS.

The problem can be made of any kind of hardwood. The design works out beautifully in quarter-sawed white oak or in red oak.

The slats and rails should be tenoned. The proper design is then transferred on them by means of a pattern, and then they are cut out.

The slats may be nailed together and sawed out four at a time, This will make for greater uniformity.

The bottom holding the pan should be mortised into the two side rails, and the hole cut out according to the size pan that is wanted.

A golden-oak stain, if oak is used, followed with a filler of the same color will give the proper shade. Twenty-four hours should elapse between coats; then a coat of white shellac should be applied. Following this, put on a coat of good varnish, and after allowing it to dry, rub with fine sandpaper, brush off the dust and follow with another coat of varnish.

If a high polish is desired, the last coat may be rubbed down with pumice stone and rubbing oil.

Bill of Materials

4 pc.	1⅜ x 1⅜	x 29	Legs
4 pc.	¾ x 3	x 13	Top rails
4 pc.	¾ x 5	x 13	Bottom rails
1 pc.	¾ x 13	x 13	Bottom
4 pc.	⅜ x 2¼	x 19	Slats
8 pc.	⅜ x 1½	x 19	Slats

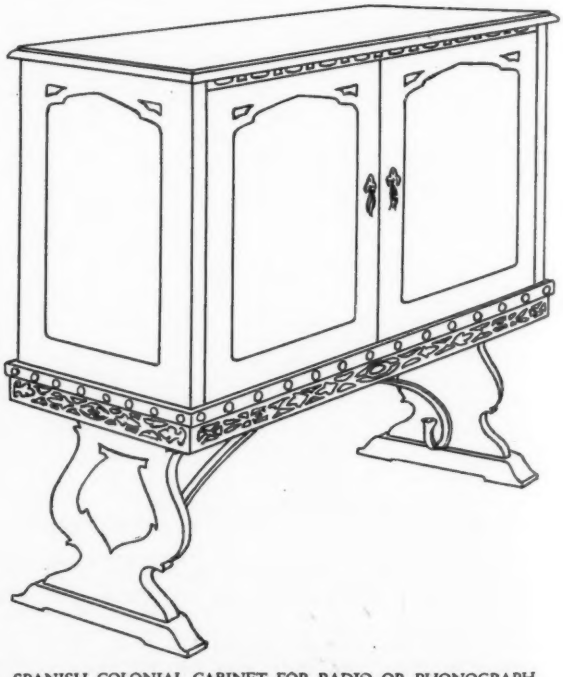
RADIO OR PHONOGRAPH CABINET OF SPANISH DESIGN

E. M. Winterbourne, Denver, Colorado

An old Spanish colonial chest was the inspiration for the cabinet described in this article. The cabinet has been designed to make it adaptable to either the new type of phonograph or a radio set.

Perhaps the most suitable wood for its construction would be either walnut or mahogany, but quartered white oak also would be good.

The sawed end supports should be made of heavy, solid material mortised into the floor stretchers. The joints should be cut before sawing the design. The bracers should be made of mild steel. They may be made of either round stock one-half inch diameter or ¼ by ¾-in. bar stock. After the brace has been shaped and the pieces riveted together, it should be cleaned thoroughly and polished with emery cloth. Then it may be blued by heating slightly over a fire and rubbing it with a lard oil. A piece of waste or cloth is used



SPANISH COLONIAL CABINET FOR RADIO OR PHONOGRAPH, DESIGNED BY E. M. WINTERBOURNE, DENVER, COLO.

to apply the oil. Continue the applications until the desired depth of color is obtained.

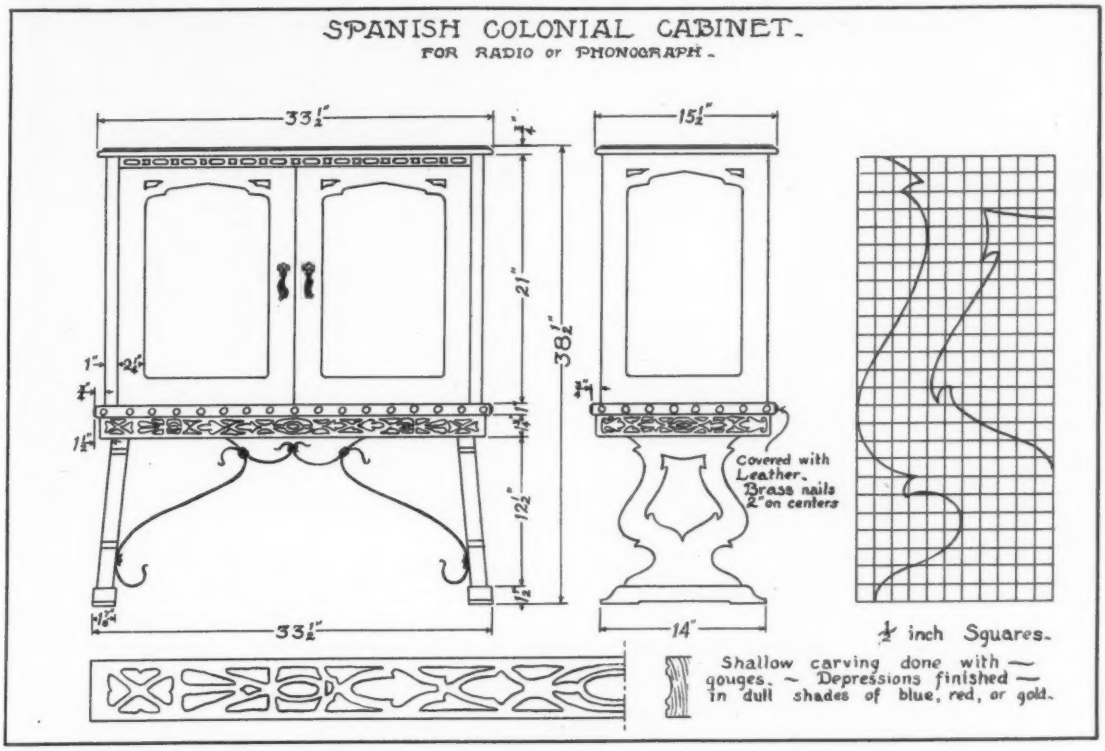
The lower edge of the case is to be covered with leather; either a thin cowhide or a heavy imitation leather in the Spanish grain. Ornamental brass tacks are spaced two inches apart all along the edge. The carved apron which runs around just underneath, should be mitered at the corners and fastened to the bottom of the case with screws.

If it is desired to use this cabinet for a radio receiving set, the panel could be set across the top of the cabinet, with the loud speaker and batteries below. Use a heavy curtain to hide the space where the batteries are stored. Another scheme which would work out nicely, would be to fit a panel on one side of the cabinet upon which the instruments could be mounted. The other side could be reserved for storage space for the batteries, and the chargers.

The ends, back, and doors may be framed and paneled if desired, or may be made of one-inch 5- or 7-ply material with the edges faced.

The cabinet should be finished in duo-tone, with the carvings in polychrome. The division lines, as shown in the design, may be made with a narrow veining gouge. The design on the end supports should be done in the same way, unless it is desired to cut out the design with the jig saw. Go over the entire piece with a light stain, and when dry, go over the borders and edges with a darker stain.

The carving should be done with flat gouges, and should be kept quite shallow. Use oil colors in tubes, thinned with a very small amount of turpentine for coloring the depressions in the carving. Use your own taste in deciding upon the colors, but do not be afraid to use several. After the colors are dry, the entire carving is to be covered with rottenstone mixed with japan drier and turpentine. The surplus should be wiped off with a soft cloth. Leave only enough of the rottenstone over the colors to give a misty, antique effect. This treatment tones down the glare of the fresh colors, and gives a pleasing effect.



SPANISH COLONIAL CABINET FOR RADIO OR PHONOGRAPH, DESIGNED BY E. M. WINTERBOURNE, DENVER, COLO.

The interior arrangement of the cabinet should be planned by the student according to the use he intends to make of the cabinet. If it is to be used for the new type of phonograph, plan to put a shelf across one side, about eight or nine inches up from the bottom, and mount upon it the motor, tone arm, etc. The amplifier may be built into the other side of the cabinet according to the rules worked out in the article on designing an exponential amplifier.

TIED AND DYED DESIGNS.

These interesting pillows were made by junior and senior high school girls in the classes of Miss Hazel T. Hathaway, director of art, State Normal and Training School, Potsdam, N. Y. Although the directions for making the designs were given in a single general lesson, no two designs were found to be alike at the completion of the problem. After tying and dyeing, wool stitches in black and colors harmonizing with the backgrounds were put in to form a design between the tied squares.

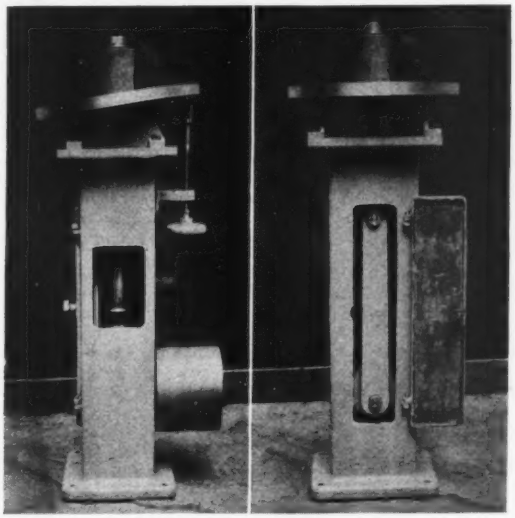
SUGGESTED PROBLEMS IN SKETCHING, BASED ON THE CROSS, AND ON THE DOUBLE CROSS. BY ALFRED G. PELIKAN, SUPERVISOR OF ART, MILWAUKEE, WIS.

A SPINDLE SANDER

The accompanying illustration shows two views of a spindle sander designed by Mr. M. F. Bleakley, instructor in machine-shop practice at the Grant Senior High School, Cedar Rapids, Iowa. The entire work of making tracings, blue prints, patterns, castings, etc., was done by the members of the class. The work was done with the limited equipment of a 16-in. lathe and a 14-in. shaper.

The sander has been in successful use for some months and has been found efficient and economical. Duplicates ot the machine will be made in the fall for each of the junior high schools in Cedar Rapids.

Mr. Bleakley has been particularly successful in developing original machinery and building it in the high-school shops. In 1925-26 a 20-in. band saw was designed and built.



SPINDLE SANDER.

(Left) Side view showing table tilted and (right) front view with door opening showing workng parts which are easily accessible.
(M. F. Bleakley, Grant Senior High School, Cedar Rapids, Ia.)

The use of the shop 58 periods each week, with 25 different pupils in each period, results in much wear on the equipment, and the replacement of lathe centers, tool posts, wrenches, gears, and other parts often becomes necessary. Since the shop began operation, the day students have made and replaced all broken parts and accessories, and in some instances, have accumulated a surplus of articles for future use. As a rule, when repairs are needed, the regular model work is delayed, and full time is given to putting the equipment in order. An entire class is put to work making lathe centers or some other piece needed in quantity. Groups may be given jobs of making repairs to machines when working a whole class would be impracticable. In doing the repairwork, however, the educational needs of the pupils are not lost sight of. The work is so arranged that the pieces made involve the manipulation of machines and tools along lines suitable to the needs of the pupils at the particular time.

To the present time the day students have built sixteen 14-inch speed lathes, two gas engines, 24 cast-iron angle plates, twelve cast-iron surface plates, numerous machine elements, such as gears, cranks, crank shafts, eccentrics, cams, screws, lathe tool rests, special taps, and other small tools. At present the students are building six dividing heads and are about to begin work on a sensitive drill press.

PRESIDENT LEE'S A. V. A. MESSAGE

President Edwin A. Lee of the American Vocational Association sends the following message to all vocational educators of America:

"I have just returned from a meeting of the local committee in charge of the Los Angeles convention. Under the leadership of a prominent business man, this committee has considered every aspect of the December meeting, and has organized the affair in a manner well-nigh perfect. At no previous meetings have I seen such enthusiasm maintained over so long a period of time, nor have I witnessed such eagerness to leave nothing undone that could, in any way help to make the convention completely successful. Every vocational educator should plan to go to Los Angeles next December."

LURE OF THE WHITE-COLLAR JOB

"I would much prefer to have my own son a top-notch mechanic than a 'shyster' lawyer. When a boy's companions, his schoolmates, his teachers, and the social institutions with which he comes in contact all are geared for a climb to the Olympian summits of respectability, the drive upon the boy to be respectable himself is truly tremendous."

So said Dr. Ralph E. Pickett, professor of vocational education of New York University, recently in a public address. He continued:

"Traditionally, what might be called the polite vocations, particularly the professions, have had a tremendous pull. Social sanction has been given to such vocations, and in most of them the monetary rewards were also great. It is small wonder that the average citizen, and this includes the recent immigrant as well as the native born, should desire such a life career for himself, or if that be impossible, certainly then for his children.

"The recent attempts to establish training programs for the neglected vocations have shown a decided emphasis in favor of the polite ones as against the vulgar ones. Our traditional-mindedness makes us still adhere to a predilection for the white-collar job as opposed to the other. The result has been an utter inadequacy of public vocational education for these vulgar vocations. Many people give lip service to a program of public industrial or technical education but have in the back of their minds the thought, for 'somebody else's children, not mine.'"

CRAFTWORK IN LEATHER AND GESSO DONE BY STUDENTS UNDER THE DIRECTION OF W. R. FENTON, INSTRUCTOR OF INDUSTRIAL ARTS, PROVINCIAL NORMAL SCHOOL, SASKATOON, SASK., CAN.

AMERICAN VOCATIONAL ASSOCIATION CONVENTION

The annual convention of the American Vocational Association will be held this year in Los Angeles, California, December 17, 19, and 20. The officers of the association, under the leadership of Dr. Edwin A. Lee, director of the division of vocational education of the University of California, are completing their plans to make this the greatest vocational convention in the history of this country. Both Canada and Mexico have been invited to participate and it will therefore be a truly North American conference. All branches of vocational education will participate—industrial arts, trade and industry, agriculture, commercial, home economics, part-time, rehabilitation, and vocational guidance.

Some of the most prominent leaders in vocational education will address the general sessions of the convention and the group chairmen have practically completed arrangements for helpful and forward-looking discussions and round-table meetings in each subject. An advance copy of the program will be published in the next issue of INDUSTRIAL-ARTS MAGAZINE.

THE MEETING OF THE ILLINOIS SOCIETY FOR VOCATIONAL EDUCATION

Mr. L. Day Perry, secretary of the Illinois Society for Vocational Education, has announced the completion of the tentative program for the next meeting which will be held Friday and Saturday, November 11 and 12, at the Hotel Sherman, Chicago, Illinois.

The Hotel Sherman will be the headquarters for the meeting and extensive use will be made of the large exhibit hall by the manufacturers and agents of school supplies and equipment. Mr. Edwin A. Lee of the American Vocational Association, and Mr. John J. Tigert, commissioner of education of the United States, will be present as speakers. The following program will be presented:

Friday, November 11, 1927

Chairman: Grant Beebe, Chicago, Ill.

Address of Welcome, William J. Bogan, assistant superintendent, Chicago, Ill.

"The Present Status of Practical-Arts Courses in Secondary Schools," Mr. Albert G. Bauersfeld, Chicago, Ill.

"How to Interest Boys and Girls in Vocational and Practical-Arts Courses," Mr. Edward F. Worst, Chicago; Mr. W. F. Rasche, Pittsburgh; and Mr. L. P. Elliott, Peoria, Ill.

Saturday, November 12, 1927

Chairman: Albert W. Evans, Chicago, Ill.

"The Improvement of Instructional Methods in Vocational and Practical-Arts Courses," Mr. J. F. Kolb, Springfield, Illinois; Mr. R. W. Selvidge, Columbia, Mo., and Mr. L. W. Wahlstrom, Chicago, Ill.

The sectional meetings which will be held on Friday and Saturday mornings will be as follows:

Art Education: Chairman, Harriet M. Cantrall, Springfield, Ill.

"Art in the State Normal Schools," Clayton H. Staples, Normal, Ill.; Miss L. Eveline Merritt, DeKalb, Ill.

Part-time Education: Chairman, Thomas Bjorge, Rockford, Ill.

"Why Retain the Part-Time School Law in Wisconsin?" George H. Hambrecht, state director of vocational education, Madison, Wis.

"Characteristics of Part-Time Pupils," Miss Grace Gishwiler, Joliet Township High School, Joliet, Ill.

"Guidance Function of Part-Time School," Mr. F. M. Trumbull, director of vocational education, Rockford, Ill.

"The Coordinator's Job," Mr. Arthur B. Mays, associate professor of industrial education, University of Illinois, Urbana.

"The Future of the Trained Apprentice," Mr. G. H. Johnson, Rockford, Ill.

"Home-Making Course for Part-Time Girls," Miss Mabel Mahoney, Vocational School, Fond du Lac, Wis.

Industrial Education: Chairman, Mr. N. F. Fultz, Cicero, Ill.

"Industrial Chemistry as a Vocational Course," Mr. L. J. Lease.

"The Development of Job-Sheet Material," Mr. R. W. Selvidge, University of Missouri, Columbia.

"Drafting from Actual Industrial Standards," Mr. H. D. Campbell, Sterling Morton Township High School, Cicero, Ill.

Commercial Education: Chairman, Marguerite Higgins, Joliet, Ill.

Personnel and Guidance: Mr. C. A. Gilkerson, chairman.

Printing: Mr. F. J. Hartman and Mr. E. E. Sheldon.

TULSA MANUAL-ARTS CLUB HOLDS MEETING

The Tulsa Manual-Arts Club opened the fifth year of its existence with a meeting on September 21. The club was organized by Dr. W. T. Bawden in 1923. It meets once each month, and after a cafeteria supper, the members take part in a discussion of problems which call for solution.

The first speaker at the September meeting was Mr. E. M. Hale, who discussed the problem of what to do with short lengths of material in the woodshop. He suggested that the material be used in making small projects such as towel racks, stationery racks, and other small pieces. Mr. R. V. Lulow, another member, described a plan for keeping an adequate supply of sharp plane irons. He has inaugurated a system which calls for a supply of sharp plane irons to be ready at all times. All dull plane irons are placed in a container near the grindstone and each pupil devotes one whole period at some time during the semester to sharpening these plane irons. Mr. C. O. Weger exhibited a progress sheet which he uses in checking up pupils in his classes in electric wiring. Each student is given a wiring board, at the top of which are experiments and problems in wiring. Across the top of the board is the progress chart; as each job is assigned, a vertical line is made opposite the name of the boy, and under the number designating the experiment to be performed. When the job is finished, a short horizontal line is attached to the vertical line. When the questions have been answered, another vertical line is added, completing a small square and showing that the experiment has been completed. The chart enables the instructor to note the progress of the pupil with a minimum of time and effort.

The officers of the club for the ensuing semester are: President, Mr. R. A. Armstrong; members of the committee, Mr. S. S. Orman and Mr. D. E. Dewey.

NEW BOOKS

Textile Fabrics.

By George H. Johnson. Cloth, 385 pages, illustrated. Price, $5. Published by Harper & Brothers, New York City.

The author of this book had a three-fold objective in view when he wrote this book.

1. To give information about the different textiles to the launderer.
2. To acquaint the retailer, converter, and manufacturer with information as to the probable wearability and launderability of the different types of textiles.
3. To furnish information relative to textiles, to home-economics classes, and the consuming public in general.

The book is well illustrated and is quite voluminous. Four of the chapters are devoted to the different kinds of fabrics while the other chapters are devoted to such matters as weaving and wear, fabrics encountered in the power laundry, rugs, knit goods and hosiery, mill practice in bleaching, dyeing, textile printing, finishing, mechanical and chemical sources of damage to textiles, natural agencies destructive to fibers, textile testing, the conservation of textiles.

The chapter on textile testing will be of special interest to teachers of science in vocational schools and to instructors of home-economics groups.

Coping-Saw Work.

By Edward F. Worst. Cloth, 134 pages, illustrated. Price, $2.40. Published by The Bruce Publishing Company, Milwaukee, Wisconsin.

The purpose of this book is to furnish the teacher of elementary manual training with a large number of attractive and educative problems in coping-saw work and toymaking.

The book contains chapters on coping-saw work in light wood, one-piece toys, jointed animals on movable stands, mechanical toys, parallel-movement toys, doll-house furniture, toy vehicles, bird houses, and kites.

The work is of such variety that it may be carried on profitably in grades 6, 7, and 8, of schools which do not have a regular shop course in manual training.

The drawings for the animals and birds are all made full size, so that they can be used directly for making stencils. This saves a great deal of time and simplifies the work of the teacher very much.

Elementary Physical Chemistry

By Hugh S. Taylor. Cloth, 533 pages. Price $3.75. Published by D. Van Nostrand Company, New York City.

The purpose of this book is to provide an introductory course in modern physical chemistry. Mathematical formulas are freely used throughout the book, thus preparing the student of chemistry to follow intelligently modern developments in the field of chemistry as set forth in professional magazines, and treatises.

The subject is discussed in fifteen chapters under the following titles: The atomic concept of matter; energy in chemical systems; the three states of aggregation—gaseous, liquid, crystalline; the velocity and mechanism of gaseous reactions; the direction of chemical change; solutions; homogeneous equilibria; heterogeneous equilibrium; electrical conductance and ionization; ionic equilibrium, weak electrolytes, strong electrolytes; photochemistry; and colloid chemistry.

Everyday Foods

By Jessie W. Harris and Elizabeth V. Lacey. Fabrikoid, 512 pages. Price $1.56. Houghton Mifflin Co., Boston, Mass.

The authors of this book have thrown precedents, in the matter of contact and arrangement of texts for cooking classes, to the winds and have tried to produce a work that involves all the major elements which the housewife takes into account when she feeds her family. First, they have accepted the commonplace fact that folks eat three meals a day—breakfast, lunch, or supper, and dinner—and that as a people certain good habits and customs have been developed in the general arrangement and menus for these three meals. They proceed accordingly to discuss the planning of these three meals, the reasons for and the methods of selecting the chief varieties of foods, the

methods of cooking or other preparation of these foods, the health values—and disadvantages—of the foods, and finally their serving.

But the housewife has more to do than select, prepare, and serve meals. She must know more than merely how and what to cook. She must understand and consider the daily food requirements of growing children, of adults (according to age, health, and occupation). Her skill in marketing may be the means of important economies for the family. She can save her strength and make her work pleasant if she has a conveniently arranged, well-equipped, and attractively decorated kitchen. She must understand the selection of china and silver and other equipment for the dining room; the social amenities of table etiquette and good usage in table service must be second nature to her. All these matters the book takes up in natural, logical order.

HEED THE CALL. THE AMERICAN RED CROSS MEMBERSHIP DRIVE, NOVEMBER 11 TO 24.

Finally, the book presents such important phases of the cooking problem as the feeding of the sick and of children, the canning of fruits and vegetables, the making of jellies and other preserves, food frills like candies and cakes and garnishes, and cooking for "occasions."

Paralleling the formal study of the subject, as outlined above, "the cookbook" proper concludes the book and outlines the specific laboratory work which may be done to make the facts and principles a reality through experience.

The authors have tried successfully to put the work on a par with other subjects in the high-school curriculum by bringing all the related elements up to a definitely scientific basis and by insisting on accurate information and study. The topics are presented in a simple, straight-forward manner that somehow seems to carry interest and inspiration, and the cookbook is amply practical for the most hard-headed experienced home cook. In everything the book is a blending of common sense with latest scientific facts and findings to meet any junior- or high-school needs.

INDUSTRIAL-ARTS SUPERVISOR DIES

The readers of the INDUSTRIAL-ARTS MAGAZINE will regret to learn of the sudden death of Mr. L. R. Stanfield, long an active teacher, teacher trainer, and supervisor of industrial arts and vocational education in the central western states.

Mr. Stanfield was a graduate of Kansas Teachers' College of Pittsburg, Kansas, did postgraduate work at Bradley Polytechnic, Columbia University, and the University of Wisconsin. He began teaching manual training in Kansas in 1906, when that subject was new in the smaller cities of the west. Later he was director of manual training in the schools of Waco, Texas, for several years, professor of industrial education in the North Dakota Teachers' College at Ellendale, and for the past three years supervisor of industrial arts and vocational education at Waukesha, Wisconsin.

Few industrial-arts men have the ability with which L. R. Stanfield was gifted, to inspire others with ideals. He saw in the crafts he taught the means of leading boys to strive toward the goal of perfection. Because of him, thousands have glimpsed what he more plainly saw and have climbed upward with his aid and encouragement. In his teacher-training work and as a public-school supervisor, he started hundreds of young industrial-arts teachers off on their teaching careers with ideals towering above just teaching how to make things.

Those who have worked with him intimately know that he was guided by high motives. Those who met him at conventions or read what he occasionally wrote, knew him to be modest and unassuming but that his ideas always deserved attention. L. R. Stanfield left a deep and enduring impression on his coworkers for the greater betterment of the work to which he had devoted his life.

His death was unexpected. He leaves a wife, two manly sons, two fine daughters, and a host of friends, who grieve his passing. —*E. M. Wyatt.*

L. R. STANFIELD.

MR. BIRD APPOINTED

Mr. Verne A. Bird recently has been appointed as director of education under Superintendent Roselle, at Mooseheart, Illinois.

Mr. Bird holds a master-of-arts degree from Rochester University. He has taught special courses in the summer sessions at Rochester University, at the Oswego Normal School, at Buffalo Normal School,

MR. VERNE A. BIRD,
Director of Education, Mooseheart, Ill.

and at the New York University. Mr. Bird was for five years principal of the Rochester trade schools at Rochester, New York, and was for three years director of vocational education in the same city. He was for seven years assistant superintendent of schools at Utica, New York.

Mr. Bird's broad training and extended experience make him especially fitted to secure even better results in the vocational and academic departments of the Mooseheart schools.

NOW, ARE THERE ANY QUESTIONS?

Tool Cabinet

739. Q.: I am this year starting a manual-training course in our high school and am desirous of obtaining information relative to plans for an up-to-date cabinet which will house tools for from twelve to sixteen pupils.—*A. F. P.*

A.: On page 364 of the October, 1924, INDUSTRIAL-ARTS MAGAZINE is described a tool cabinet for the junior high school at Jacksonville, Fla. On page 214 of the June, 1925, number of the INDUSTRIAL-ARTS MAGAZINE is the description of a tool locker which is used in the home-mechanics department of the vocational school at Milwaukee. Page 84, March, 1927, describes a bench-tool cabinet for the Washburn Junior and Senior High School, Minneapolis, Minn.

Lumber Table

735. Q.: I should like to have information on where I can secure a lumber table which will aid in figuring the cost of lumber in various sizes at various prices per foot. I shall be very grateful for this information.—*E. H. M.*

A.: The Manual Arts Press, Peoria, Illinois, publishes a Handy Lumber Table by Densmore at 15 cents. There is also a lumber table in Griffith's Carpentry, p. 169, published by the same firm, for $1.70.

E. H. Alberty, Winfield, Kans., publishes "Seventy-two Handy Lumber Tables" which sells at $1.00.

Painting Gas Ranges

734. Q.: I have three gas ranges, which have to be refinished. Can you suggest what paint to use? Would like to make them gray or blue enamel if possible.—*A. W. B.*

A.: Owing to the high temperature in the body of the gas range during the process of operating the oven, it is not only impossible but highly dangerous to attempt the use of any paint or lacquer material now on the market.

I have checked up on these materials by applying them on stove pipes, and in each case dangerous and highly explosive fumes began to appear at 150° F. When you consider that the baking temperature in ovens generally occurs around 325° you will readily appreciate the possibility of a dangerous flash. I regret to say that nothing remains other than the usual water-type graphite polishes.

In further explanation, the gray and blue enamels found on modern cooking equipment are vitreous types and not oil enamel. These are similar to the ones used on bathroom fixtures and are fired after successive dips at temperatures ranging from 900° to 1550° F.

Do not, therefore, attempt to apply any paint material to these gas stoves. It might be added parenthetically, that the monthly report of the Mutual Protective Association, gives notice of two deaths from fires occurring through the painting of stoves.—*Ralph G. Waring.*

NEWS AND NOTES

Vocational Teacher-Training in Baltimore. The industrial-arts course for teachers of Baltimore, Maryland, which was established during the past year by the Maryland Normal School in cooperation with the city department of education, has proved a desirable addition to the whole teacher-training program. Under the system it is now possible for boys who have graduated from high school to secure two years' professional training beyond high school, which makes it possible for them to qualify as industrial-arts teachers of the elementary schools. From this classification, with additional educational work, it is possible for them to qualify as junior- and senior-high-school instructors. It is proposed to establish courses for industrial-arts teachers, in cooperation with the colored training school, for high-school graduates who desire to teach the work in the colored schools.

The Maryland University has carried on teacher-training courses for vocational and prevocational teachers for a number of years and many of these teachers have qualified for appointment through the courses offered. It has been possible, through the training offered, to improve the teaching efficiency and the quality of work in the several subjects.

Organization of Manual-Training Activities in 1927-28. A reorganization of all departments of the Sioux City, Iowa, schools has been attempted by Supt. M. G. Clark. In connection with this reorganization, it has been deemed desirable to transfer the responsibility for the special departments to the assistant superintendent, who works with the personnel of the departments as the general chairman of their group.

Under the plan, the scope of the work for the year, as arranged by the superintendent, is as follows:

1. Woodshops
   - *a)* High schools
   - *b)* Junior high schools
2. Automobile shop
   - *a)* Central High School
3. Printshops
   - *a)* High schools
   - *b)* Junior high schools
4. Finding activities
   - *a)* Junior high schools
5. Prevocational and special shops
   - *a)* Woodrow Wilson School

Among the activities to be attempted during the year, is a study of the industries of the city, the formulation of a complete course of study for the department by years and divisions, a study of the application of the course of study to the aptitudes of the students, and the presentation of a complete report covering the work of the department.

Summer Work of the Cincinnati Industrial-Arts Department. The industrial-arts department of Cincinnati, Ohio, again this summer under the direction of Mr. E. W. Christy, manufactured furniture for the primary department. The work has been carried on by the boys from the various industrial-arts centers in the shops at the Withrow High School. The work has offered an opportunity to the boys to help design and manufacture the furniture, as well as in making them feel the pressure of shop organization and to see how the projects are carried through. The following equipment has been manufactured: 150 drawing easels, 160 ferneries, 195 sand tables, 90 store shelves, 90 primary workbenches, 180 saw boxes, 500 coping-saw vises, 50 maple benchtops, 50 pipe-frame benches, 61 drawing tables, 808 tables, 650 drawing boards, 60 phonograph stands, and 40 gameboards.

Mr. Gladstone Califf, who has been instructor in the Deerfield, Ill., township high school, has removed to Quincy, Ill., where he will teach manual training in the grades.

Progress of Artwork in New York City Schools. Supt. of Schools William J. O'Shea of New York City, in his 28th annual report for 1925-26, includes a report of Mr. Forest Grant, director of art in the high schools, on the work done under his supervision during the period from September, 1925, to August, 1926.

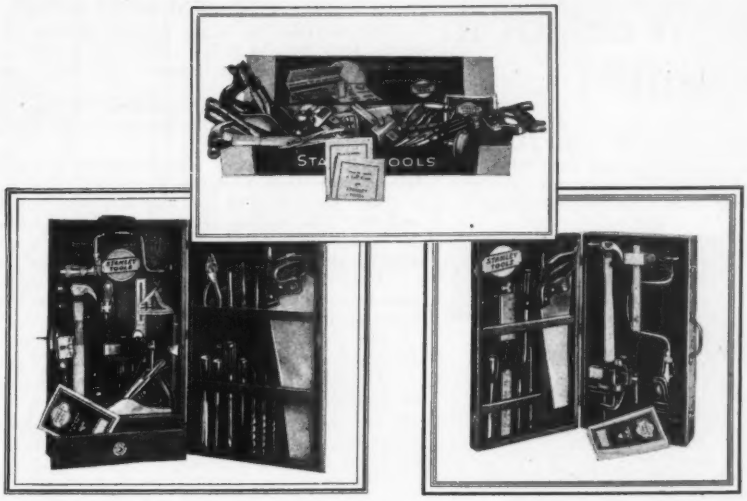
The work of the art department has included the visitation of classes as a means of improving the standards of teaching and work; conferences with principals of high schools regarding the welfare of the art departments of schools; addresses and talks to organizations and classes on subjects relating to the teaching of art in high schools; promotional work in the form of correspondence, personal visits, and cooperation with outside organizations; and the preparation of monthly bulletins giving information concerning the exhibits and the topics to be discussed.

It is brought out that the elective art courses have increased in number and are being placed upon a firm basis through the continued use of a new form of syllabus. The artwork in the Richmond, Walton, and Lane High Schools has been reorganized to conform to the new three-year elective course. The courses in art appreciation have enjoyed a large increase, an increase of 2,802 being reported in the period from the fall of 1925 to the fall of 1926.

The most significant accomplishments of the year were the establishment of an industrial-art course in the Girls' Commercial High School, and of a postgraduate course in commercial design for boys in the High School of Commerce.

It appears that the greatest need of the city at the present time is an institution of high-school grade where boys can take suitable courses in drawing and design as major studies for four years. These courses would seek to train boys for further study in advanced art schools, and to fit them for work in various lines of industrial art and design similar to the work offered in the Washington Irving High School for Girls.

Among the important recommendations of the art director are the need for properly designed rooms or corridors for the display of fine examples of artwork from all departments, and means for providing a more effective use of the Metropolitan Museum of Art and the Brooklyn Institute Museum, for the benefit of teachers and students of the art department, as well as for the other departments of the school. The educational department now housed in the Metropolitan Museum of Art has already done much to increase the scope of the artwork and to promote cooperative efforts.



A Christmas suggestion for your boys

An appropriate project for Christmas time! Have your boys make tool chests for their own use or to give as presents. We have a plan for a small tool chest No. S70 and a plan for a large tool chest No. S71. These plans will be sent free on request to any Supervisor or Instructor of Manual Training.

The booklet No. S35 illustrated on the right, describes the complete line of Stanley Tools in sets. A quantity of these will be sent free to Supervisors and Instructors of Manual Training.

This booklet may offer a suggestion to parents interested in purchasing a set of tools to start the boy's home workshop or may offer suggestions to the boy for making a chest or cabinet of his own design.

Tool sets make excellent Christmas gifts and may stimulate and encourage the boy to carry on work at home.

Stanley Tools in sets are well balanced, practical sets. They are sold in chests or in cardboard boxes. When furnished in a cardboard box a Stanley Plan is enclosed to help the boy make his own chest.

Send for these Plans No. S70 and No. S71. A quantity of the booklets S35 we will send to you free upon request.

THE STANLEY RULE & LEVEL PLANT
Educational Department
NEW BRITAIN CONNECTICUT

Plans
for making
tool chests

STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

What is the "Web" of a twist drill?

And the "Heel"—the "Lips"—the "Body"—and just where is the "Point"? Do you know just what "Lip Clearance" means?

The "HANDBOOK FOR DRILLERS" answers every question the student of modern drilling practice must know. It tells him not only the "How" but—what is more important—the "Why" of the different parts of the twist drill.

Because this booklet is both theoretical and intensely practical, it is being used by hundreds of Vocational, Technical, and High Schools throughout the world as the standard textbook on drilling practice.

The "HANDBOOK" is issued by this Company, not to promote the sale of its products, but to educate prospective and not a few **experienced,** drill users to a better and more intelligent understanding of the twist drill and its use.

Instructors are cordially invited to ask for copies of the "HANDBOOK FOR DRILLERS" in any reasonable quantities free of charge, for the use of their students.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

PERSONAL NEWS NOTES

Mr. Charles A. King, formerly director of manual training at the State Normal School, Plymouth, N. H., has retired and is making writing his chief interest. Mr. King now resides at East Kingston, N. H.

Mr. V. L. O'Connor of Summit, Ill., has accepted a position as instructor in architectural drawing in the Lane Technical High School, Chicago.

Miss Ada Foster, home-economics instructor at Raymond, Illinois, has accepted a position in the high school at Roseberg, Texas.

Mr. Jerry Witt of Mt. Ida; **Mr. W. T. Blount** of Plainview; and **Mr. Abe Collins** of Dequeen, Ark., have been appointed to the board of trustees for the fourth district state vocational high school of the state. The district embraces twenty counties.

Miss Elizabeth Dulin of Woodstock, Va., has been appointed assistant supervisor of home economics in the vocational school at Conneautville, Pa.

Mr. Fred P. Kern has been appointed director of the vocational department in the Delaware School, Syracuse, N. Y.

Mr. D. E. Eldridge of Greenfield, Mass., has been appointed instructor in manual training at Plymouth.

Mr. Louis Wormelsckirchen has been appointed as instructor in vocational agriculture at Farmington, Iowa, to succeed G. C. Chandler.

Mr. John M. Fecher, formerly principal of the Essex county, New Jersey, vocational school, has accepted a position as assistant to Mr. W. A. O'Leary, assistant commissioner of vocational education in the New Jersey Education Department.

Mr. Frank Porter of Newport, Ind., has been appointed as vocational teacher in the high school at Portland.

Among the new positions recently filled in the California State Education Department are the following: Supervisor of agricultural education, Mr. Julian A. McPhee; supervisor of trade and industrial education, Mr. J. C. Beswick; supervisor of civilian vocational rehabilitation, Mr. I. W. Kibby; supervisor of homemaking education, Miss Maude I. Murchie.

The department of vocational education of Iowa has announced a number of changes in the staff of the state vocational department. The new appointees are all Iowa people and all have had adequate training and experience to fit them for the particular positions to which they have been assigned. Mr. James J. S. Mitchell has become assistant in the rehabilitation department; Miss E. Grace Young also has been appointed an assistant in the department; Mr. H. W. Carmichael has been appointed supervisor of trade and industrial education, to succeed Mr. H. M. Brook, and Mr. George F. Ekstrom has been appointed supervisor of agricultural education.

Mr. R. R. Schmitz, formerly at the Alabama School of Trades, Gadsden, has been appointed as itinerant teacher trainer and assistant supervisor of trade and industrial education in Alabama. Mr. Schmitz, who succeeds W. E. Patterson, is a skilled tradesman and a graduate of the University of Alabama in the department of vocational education. Mr. Schmitz is a member of the University of Alabama faculty and makes his headquarters at Tuscaloosa.

Mr. Russell J. Greenly, for five years director of vocational education at Abington, Pa., has been appointed head of the industrial teacher-training department in the University of Akron, Akron, Ohio.

Mr. Greenly is a graduate of the Williamson Trade School. He brings to his new position a wealth of experience gained in the teaching field as well as in the commercial world. For six years he was connected with the DuPont Company of Wilmington, Delaware, in the fields of construction and maintenance, and he had five years' experience in vocational teaching. Mr. Greenly was the founder of the vocational club of the Abington High School and was responsible for the development of the part-time cooperative plan of vocational education in suburban Pennsylvania.

Mr. Arnold A. Vieth is the new science instructor in the Boys' Technical High School, Milwaukee, Wis. **Mr. Rudolph Sandes** teaches in the plumbing shop, and **Mr. Elmer E. Harmes** succeeds Mr. Foss in the art department.

Mr. Paul Wheeler has been appointed supervisor of manual-arts work at Bartlesville, Oklahoma, to succeed Mr. Herbert Detjen, who has gone to Tulsa.

Mr. W. J. Breit, formerly state director of civilian rehabilitation work in Arkansas, has been appointed state supervisor of trades and industries, to succeed Mr. H. C. Givens. Mr. A. S. Ross succeeds Mr. Breit as director of the rehabilitation work.

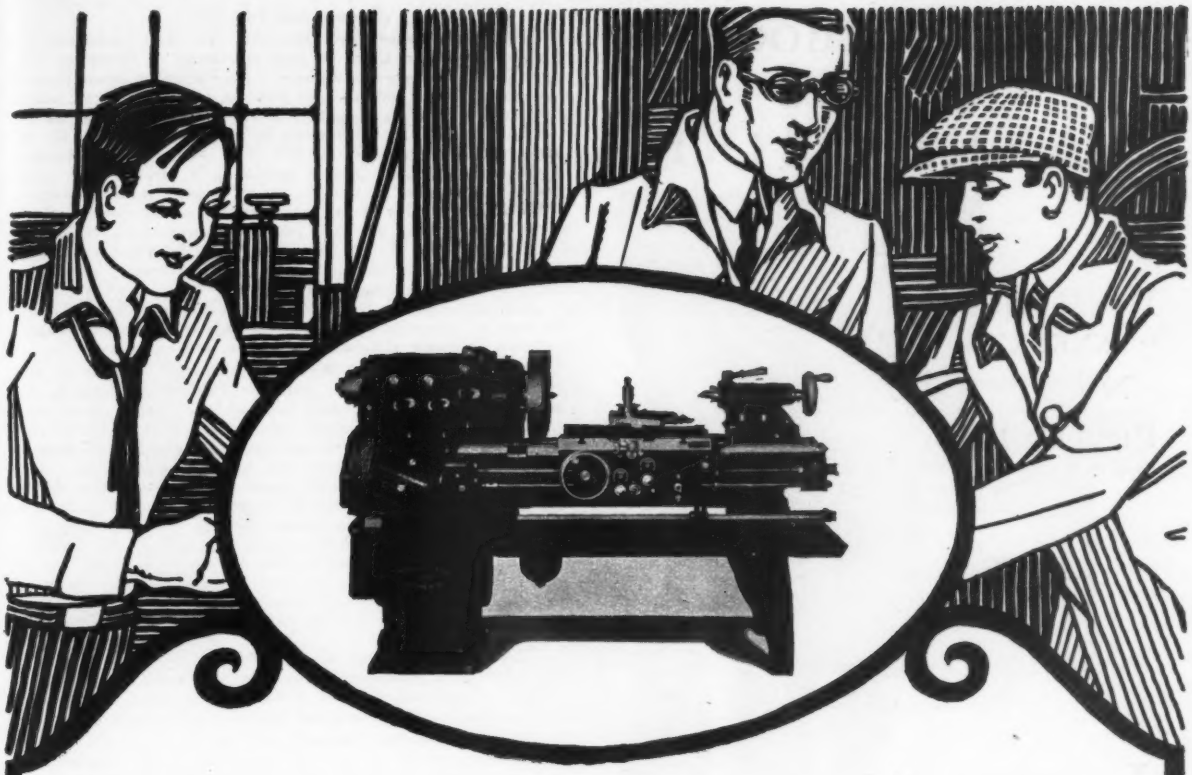
Mr. E. W. Walker, of Selma, Ala., is teaching industrial arts at Dothan, Ala.

Mr. Harry Reid is instructor in manual training in the senior high school at Selma, Ala.

NEWS AND NOTES

Will Select Site for Vocational School. The board of education of Buffalo, New York, has taken steps toward the selection of a site for the new Elm Vocational School. The recommendations of the board will be referred to the city council for approval.

(Continued on Page 30a)



Train Your Students for Their Jobs — Use MONARCH LATHES

Train your students on MONARCH LATHES and when they go from your school they will be ready for their jobs —valuable men immediately without the necessity of going through another period of training in the shop.

The student that is trained on a Monarch Lathe is trained in actual shop practice — for the Monarch is the first choice of Industrial America. Today more Monarch Lathes are being sold to industrial plants than any other lathe built.

The Monarch motor-driven, helical geared Lathe is the ideal equipment for instructional purposes. It is far in advance of other lathes in design. It is as near danger-proof as any lathe can be made. It is as noiseless as any lathe can be—an important advantage in the instruction room.

Monarch Lathes are used in the Massachusetts Institute of Technology, Yale, Cornell, and in hundreds of the best technical and high schools — proof that the Monarch is the practical lathe for modern school equipment.

The success of your school and the success of your students are inseparably linked together. Use MONARCH LATHES and meet the modern demand for training that *fits men for their jobs.*

Illustration above shows 14 x 6 helical geared Monarch Lathe

THE MONARCH MACHINE TOOL CO.

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Good Schools deserve "YANKEE" TOOLS

"YANKEE" No. 41 Push Drill

Eight Tested Drill Points 1-16 to 11-64 inch in handle of each Drill.

Just play to bore holes

For the action of "Yankee" Automatic Push Drills is so smooth and easy that practically no effort is needed to drill holes — This means speed.

With only the slightest push, the point quickly bites its way inward. As with all "Yankee" Tools, ingenious design and superior construction save time and labor.

Drill point revolves backward in upward movement of handle to clear chips.

Some other "Yankee" Tools: Spiral Screw-drivers, Plain Screw-drivers, Ratchet Bit Braces, Ratchet Breast, Hand, Chain and Bench Drills, Ratchet Tap Wrenches, Vises with removable base, etc.

Dealers Everywhere Sell "YANKEE" Tools

FREE New "YANKEE" Tool Book

Write for this interesting little book. It tells just what you want to know about all the famous "YANKEE" Tools for making work easier and quicker.

No. 41 (illustrated). No. 44 has spring with adjustable tension for regulating pressure according to nature of wood, size of drills, etc.

"YANKEE" on the tool you buy means the utmost in quality, efficiency, and durability.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

(Continued from Page 28a)

Ohio Conference for Plumbers. The first conference for plumbing teachers in Ohio was held in August, at Columbus, with twelve teacher-plumbers in attendance. The conference extended over a two-week period and took up such problems as trade practices, courses of study, methods of teaching, practice teaching. Among the instructors were Mr. E. L. Bowman, Mr. S. E. Dibble, Mr. W. H. Stone, Mr. S. Lewis Lans, and Mr. F. C. Moore. It was brought out that the State of Ohio is sponsoring a part-time day trade-training program for apprentices and is making splendid progress. In 1925-26 the number of apprentices enrolled in day training schools was 329, and during the fiscal year ending with June, 1927, there was an enrollment of 370 day apprentices. In addition to these, there are more than 150 journeymen attending evening schools for special instruction relating to their craft.

The apprenticeship program in Ohio, which is responsible for the work in apprentice training, is in charge of a special commission composed of master plumbers, journeymen, and educators.

Vocational-Guidance Work in Baltimore. During the year 1925-26 approximately 28,197 pupils in Baltimore, Maryland, were reached in the junior and senior high schools, either through group or individual guidance. Through personal interviews, counselors were able to help the pupils in the selection of courses and electives, in readjusting unfortunate choices, and in the prevention of failure. The counselor had an unusual opportunity for indicating further educational possibilities and for directing students to self-guidance in the choice of occupations, by putting them in touch with sources of accurate information. Much of the guidance work has been rendered through reading. Vocational libraries have been established in the various schools. A bulletin on vocational guidance for use in the junior high schools was revised during the year, and other pamphlets and posters containing information on vocational possibilities were prepared and issued.

One of the handicaps of the vocational-guidance bureau is the lack of a central placement bureau which is essential to complete the program. Organized placement is the next step which must come, in order to complete the program of vocational guidance.

New Commercial Course in Baltimore. One of the outstanding achievements of the year 1925-26 at Baltimore, Maryland, was the completion and printing of a course of study in commercial subjects for the junior and senior high schools. The course which was prepared with the cooperation of the teachers and department heads, has been in demand by many business educators in the city, as well as in other cities and universities. The course is being used by the school of education of Michigan University and by the Harvard graduate school of education for reference purposes.

Industrial-Arts Work in Baltimore. The industrial-arts department of Baltimore, in a report covering the work for the year 1925-26, shows that during the past five years there has been a material increase in the number of schools which offer industrial-arts work to pupils of the fifth and sixth grades. In all the newer elementary schools, provision has been made for well-equipped, suitable industrial-arts rooms, so that in many cases the work has been extended to include the lower grades.

In the junior high schools of Baltimore, provision has been made for instruction in sheet-metal work, electricity, machine-shop work, printing, and auto mechanics, in addition to woodworking and mechanical drawing.

Courses of study in industrial arts have been developed for these schools by the teachers, who worked in groups according to the subjects taught. Lesson plans and instruction sheets based upon the courses of study, show a steady progress in this line of work.

A vocational school for colored boys was placed in operation during the past year. Auto repairing, shoe repairing, carpentry, and cabinetmaking shops are provided in well-equipped, comfortable rooms. Academic, related subjects, mechanical and architectural drawing are other subjects taught.

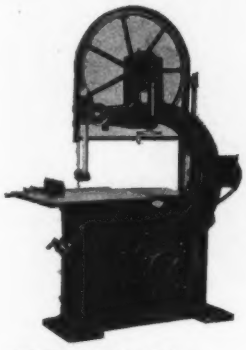
Survey of Vocational Education in Tennessee. Mr. D. M. Clements, state supervisor of vocational education in Tennessee, recently has issued a report on the results of a survey of vocational education in agriculture. The survey shows that 75 per cent of the farm boys who go to school where there is a department of vocational agriculture, take the course; that 51 per cent of all the boys who finish the course engage in farming; that 16 per cent of all the boys who finish agricultural work in the schools take the work in college; that very few boys taking vocational agriculture are idle, while 24 per cent of the other students who do not take agriculture are idle.

The survey sought to obtain the opinion of principals of high schools relative to the value of the agricultural department in their schools. It was brought out that more than 80 per cent of the principals felt that the department had increased the enrollment, had kept the boys in school longer, had caused students to be more regular in attendance, had caused the patrons to take an interest in the school, had given the students a definite aim in their education, and had vitalized the teaching of other members of the school faculty.

(Continued on Page 35a)

A *for every* WOODWORKING *purpose* MACHINE

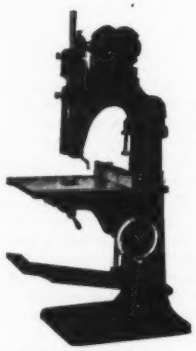
IN THE MANUAL TRAINING OR VOCATIONAL DEPARTMENT



36" Direct Motor Driven Band Saw.

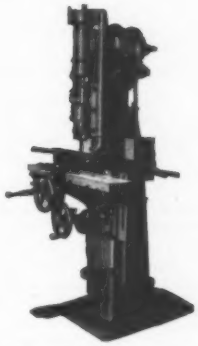
Type G-44 Motorized Straight Line Cut-Off Saw.

Type B-8 Motorized Single Surfacer

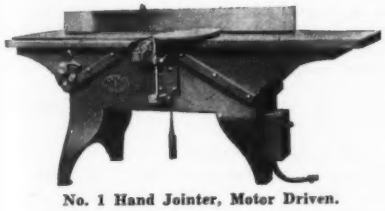


No. 2 Motor Driven Vertical Borer.

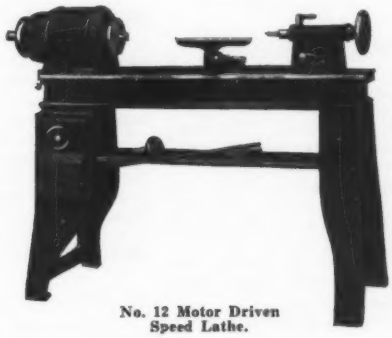
MOTORIZED woodworking machinery invariably is installed in all new schools having manual training or vocational departments. They eliminate practically all belts, are safer to operate, save power, and permit a more systematic grouping of machines in the department. Yates-American builds a complete line of high-quality motorized woodworking machines particularly applicable to school work. A few are shown here. Detailed information on these or other types will be sent gladly.



No. 25 Motor Driven Vertical Hollow Chisel Mortiser.



No. 1 Hand Jointer, Motor Driven.



No. 12 Motor Driven Speed Lathe.

No. 20 Motor Driven Universal Saw Bench.

Teach your students today on the machines they will use tomorrow. Yates-American machines are more widely used throughout the world than any other make. Those machines most used undeniably are best.

YATES-AMERICAN MACHINE COMPANY

Educational Department **Beloit, Wis.**

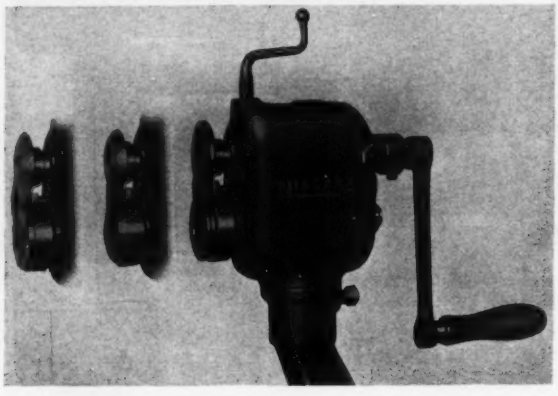
SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

A NEW NIAGARA BENCH MACHINE

The Niagara Machine & Tool Works of Buffalo, New York, has announced the marketing of a new Niagara combination bench machine, which is intended for use in the operations of turning, wiring, or burring. The machine is particularly adapted for general use in the sheet-metal shop, the tinshop, the maintenance shop, and the school shop, and can be furnished as a one-purpose machine, or with a full set of rolls.

The machine has a one-piece, extra-heavy frame for rigidity and strength. The bearings for the lower shaft are cast in the frame and the upper shaft is pivoted at the back. The faces are of high-grade steel, hardened and polished. The gauge is of high-grade steel and is equipped with a fine screw adjustment with locking nut. Suitable adjustments are provided for the upper face and shaft which may be adjusted literally for variation in thickness of material. A superior bench standard is furnished with each machine.



COMBINATION TURNING, WIRING, AND BURRING MACHINE.

School-shop instructors who are interested in a machine of this kind should address the Niagara Machine & Tool Works at 637 Northland Ave., Buffalo, New York.

FILMS ON CYLINDRICAL GRINDERS

Teachers of machine shops will be interested to learn that Cincinnati Grinders, Inc., of Cincinnati, Ohio, has just completed four educational films, illustrating the use of cylindrical grinders. The films are in the form of a series of still pictures which can be shown on the screen. This provides ample time for discussion, for which special lecture notes will be provided if desired.

The films are available with no obligation, to all educational institutions. They cover the following machines: 8-in. saddle-type grinder, plain self-contained grinder, plunger-cut grinder, self-contained universal grinder.

Write the publicity department of Cincinnati Grinders, Inc., Cincinnati, Ohio, if you care to use any of these films.

SAW BOOKLET FOR TEACHERS OF MANUAL TRAINING

E. C. Atkins & Company of Indianapolis, Indiana, has issued a book of 48 pages, entitled "Saw Sense," which contains much valuable information for carpenters and manual-training teachers. The book is profusely illustrated and contains illustrations and explanatory material on saws for every purpose.

Special attention has been given in the book to the care and use of the saw. Directions are given on how to file, and set a handsaw, ripsaw, and panel saw. A number of tables of useful information have been included in the last half of the booklet.

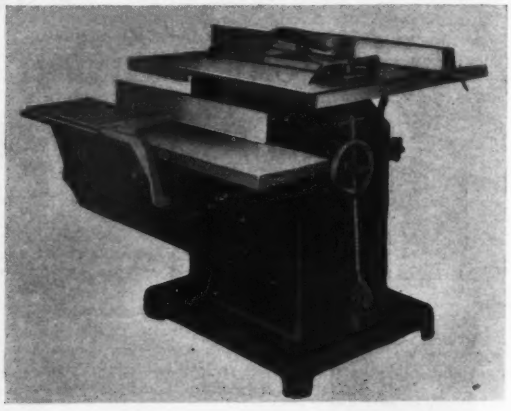
Manual-training teachers who desire copies of the booklet may obtain them by addressing the advertising department of the Atkins Company, at 402 South Illinois Street, Indianapolis, Ind.

COMBINATION UNIVERSAL SAW AND 8-IN. JOINTER

The Gallmeyer & Livingston Company of Grand Rapids, Michigan, have developed a new combination universal saw and 8-in. jointer. This is an entirely new feature in the portable-machine line. The machine is of the direct-motor-drive type, but is so constructed that each unit operates separately from one motor. When changing from one unit to another, all that is necessary is to drop the saw to its lowest position and move a slip collar so as to engage the unit desired.

The motor-on-arbor construction eliminates all gears and belts, and the machine may be had either with a 1-h.p., 220-volt motor, or a special 110-volt motor for lamp-socket attachment as desired. In either case the motor is large enough to rip 2½-in. stock at a satisfactory speed.

The unit is mounted on a portable truck-type pedestal base, a characteristic of the "Union" line machines. Both machines, the jointer and the saw are of the regular standard type. The jointer is 44 in. long over all, and the table is so constructed as to permit rabbeting up to ½-in. deep, and will handle stock up to 8-in. wide. In addition, the jointer is provided with an adjustable fence, which may be tilted to 45 deg., a safety cylinder, and a safety guard.



UNIVERSAL SAW AND 8-IN. JOINTER.

The saw unit has a table, which is of a 30 by 34-in. size. The table may be tilted to a 45-deg. angle; a dial is so arranged as to indicate to the operator the exact degree of tilt. A crosscutting gauge and a ripping gauge are the standard equipment on this saw. In addition, the saw is well guarded by means of a saw guard and splitter guard. A saw 12 in. in diameter that may be raised above the table high enough to cut stock 2½ in. thick is mounted on the arbor; moreover, the saw arbor is so constructed that dado heads up to 1½ in. wide may be attached. The motor is equipped with the best grade of ball bearings.

The new 24-page bulletin of the Gallmeyer & Livingston Company, Grand Rapids, Michigan, describing the very complete line of portable woodworking machines manufactured by the firm, will prove of interest to teachers and supervisors of school shops. The bulletin describes the combination universal saw and 8-inch jointer, the combination saw and 6-inch jointer, the motor-on-arbor single-saw bench, universal saw bench, the union plain saw, the individual 8-inch hand jointer, the single- and double-spindle shapers, the vertical boring machines and hollow-chisel mortisers, the horizontal boring machines, and the 16-in. and 20-in. band saws, and gives complete specifications for all the machines listed. In addition, there are photographs which show each particular machine in detail. The catalog enables those interested to obtain a clear conception of what each machine is expected to accomplish under regular working conditions.

ISSUE CATALOG OF "HARD-TO-GET" MATERIALS

The Thurston Manual Training Supply Co., Anoka, Minn., has just issued its thirteenth annual catalog. The pamphlet contains 64 pages filled with information about numerous hard-to-get articles. Woodworking, cabinetmaking, and manual-training teachers will be especially interested in this catalog.

Among the articles listed are upholstery supplies, lamps and lamp shades, moldings, decalcomania transfers, overlay carvings, cabinet and furniture hardware, wood finishes, glue, lacquer, shellac, sandpaper, art fiber, wire lamp frames, electrical adapters, and some knockdown furniture.

For a copy of the catalog, write to Thurston Manual Training Supply Co., Anoka, Minn.

NEWS AND NOTES

Establish Schermerhorn Scholarship. The Association of Home-Economics Teachers of the New York City elementary schools has established a Grace Schermerhorn scholarship at the college of home economics of Cornell University. The scholarship which was established as a memorial to a former director of homemaking in the New York schools, has been given this year to Miss Delight McAlpine, who was graduated from high school last June and entered college this fall.

Select Site for Vocational School in Minneapolis. The special site committee of the city of Minneapolis has selected a site for the proposed Vocational School for Girls. A bond issue of $450,000 will be issued and sold during 1927 to be used for the purchase of the site and the construction of the building for the new school.

(Continued from Page 30a)

The survey also sought the opinions of men on the outside, such as the banker, the merchant, the lawyer, and the doctor, and the answers came back more than 90 per cent strong. These men all commended the good work of the vocational-agriculture department and held that it had caused better methods of farming, had improved the quality of farm products, had improved living conditions among the people, had caused the farmers to save more money, had created a desire on the part of farm boys to go to school, had caused students to stay in school longer, and had created an interest in farming.

Improvement of Negro Education in the South. Dr. E. H. Shinn, specialist in agricultural education in the U. S. Department of Agriculture, in a recent statement, pointed out that racial relations in the south are improving and that one of the evidences is in the general attitude among the whites toward the improvement of educational opportunities for negroes. Dr. Shinn shows that the negro and white people are coming to a better understanding, and that development of agricultural education has made an important contribution to improved relations. Negro agricultural colleges, Smith-Hughes vocational schools, and extension service are the principal agencies devoting their efforts to agricultural education in the south. The number of federally aided all-day negro agricultural schools has increased from 39 in 1917-18 to 254 in 1924-25, and the enrollment has increased from 1,025 to 6,374, which represents a little over four per cent of the 146,000 negro farm boys between the ages of 14 and 20 years attending school.

Dr. Shinn points out that public-school expenditures in the south have increased 941 per cent since 1900. The annual expenditure for negro education in 1926 reached $3,700,000.

Practical-Arts and Trade-Preparatory Classes in Erie, Pa. Practical-arts work for boys and girls in the upper-elementary grades of Erie, Pa., was introduced to meet a demand for that form of training which has been eliminated from the home and greatly limited in the factories. Considerable attention is paid to the health of pupils and a complete system of physical development has been made a part of the schoolwork.

The work in practical-arts for boys in the junior high school is termed general shopwork, and the activities take the form of woodworking, patternmaking, plumbing, electricity, sheet metal, printing, machine-shop practice. The shops are equipped to accommodate twenty boys and each group takes up the various activities in turn. The work is required of all pupils in the seventh and eighth grades, and the instruction offers a variety of shop experience that enables the boy to test his interests and abilities and to get a better understanding of his potentialities as bearing upon his lifework.

The trade-preparatory classes are elective and operate in accordance with the Smith-Hughes law, offering two years of specific trade-training to boys 14 years of age or over who choose the work. The courses cover cabinetmaking, machine-shop practice, sheet-metal construction, electricity, tailoring, plumbing, mechanical drawing, and auto mechanics.

The basis of the instruction in each of the trade-preparatory classes is the construction of a practical and marketable product. The classes contribute largely to the new work and repairs of the school district, and during the past year were responsible for the construction of the new equipment in one of the junior high schools. The tailoring students make clothing for themselves and they also make the uniforms for the school bands and for outside institutions. A summary of the shop orders issued by the business office for various equipment, repairs, and printed forms for the year shows a group of shop orders completed at a cost of $9,191 and having a commercial value of $13,711. The cost of the material alone for the products turned out was $4,520. The industrial plants of the city cooperate with the trade-preparatory classes by assisting in shop visits to industrial plants and by providing employment for the graduates of these courses.

The practical-arts work for girls consists of millinery, sewing, cooking, and home nursing. At present eight weeks of two hours per week are given to home nursing by the cooking teachers of each high-school center. In sewing and millinery, the girls work upon practical projects of wearing apparel. A style show is regularly given which has proved a splendid project for creating interest among the students.

How to Avoid Excessive Labor Turnover in Industry. The Metropolitan Life Insurance Company of New York City has issued the second bulletin of its "Labor Turnover Series," in which it attempts to show that a successful "exit interview" is necessary to avoid billions of dollars lost to industry through excessive labor turnover. The bulletin points out that in interviewing an applicant for a position, the interviewer must learn the facts about the employee and reasons for his seeking new employment. The interviewer should be able to visualize the individual's problems, his job, his progress with the company, and his opportunities. He should also give pertinent information about the company's policies, the opportunities to be afforded, and ways of taking advantage of them. The report concludes with the finding that exit interviews are necessary to the

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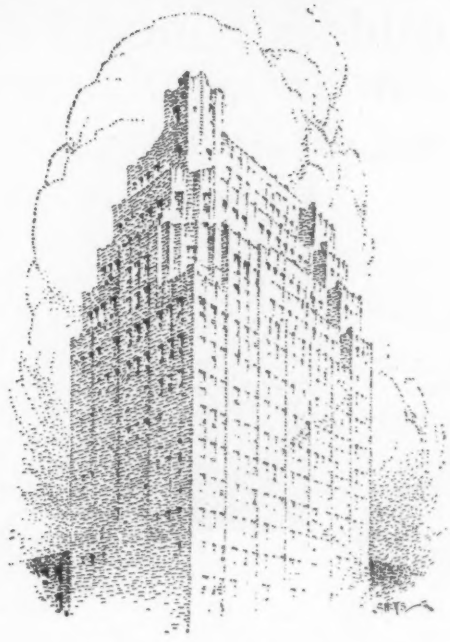
TECHNIQUES



Fine Line Technique

THE above pen and ink drawing, extremely light in feeling, is a direct opposite to the thick-lined, heavily shadowed type of technique seen so frequently and illustrated in this series of advertisements but a short time ago. It represents still another variation of the ever-interesting Black-and-White handling which Higgins' American India Ink makes possible.

Such light treatment—such delicacy—owes its effect partly to the thinness of the lines, whether they be in long, sweeping strokes, short ones or cross hatch—and partly to the white space or board intervening between the lines. The subject above has been especially selected to give this light, airy feeling.

Detail may also be included if the requirements dictate and if it is not too heavy, though this treatment serves better when imaginative areas are to be created.

Equally effective for this delicate technique are Higgins' General (Soluble) and Higgins' Waterproof Black Drawing Inks. You may obtain either as well as any of the 11 brilliant Higgins' Colored Drawing Inks at your regular supply dealer's.

"Techniques" an extensive new handbook just off the press, shows a number of exceptionally artistic treatments which are made possible through the use of Higgins' American Drawing Inks. Send for it.

CHAS. M. HIGGINS & CO.
271 Ninth St., Brooklyn, N. Y.

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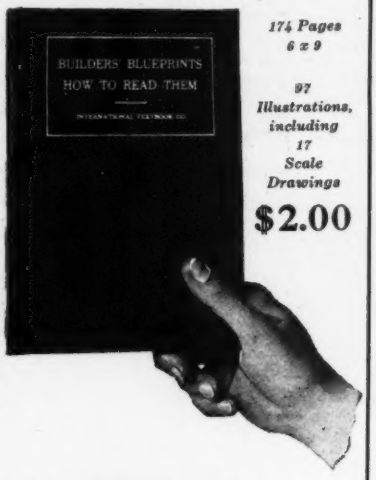
Builders' Blueprints
HOW TO READ THEM

Many Schools Using This Book



174 Pages 6 x 9

97 Illustrations, including 17 Scale Drawings

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Recommended for

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b. **Reference Book for Industrial Arts Classes**

c. **Evening School Trade Classes. By using this book, Building-Trades Mechanics can master the art of Blueprint Reading without studying Architectural Drawing. This is the quickest way for them to secure advancement.**

TABLE OF CONTENTS

Drawings, Blueprints, and Specifications. Drawings used to represent buildings. Use of the Scale and the Rule. Openings in Walls and Partitions. Indications Used in Drawings; of Parts, or Elements, of Buildings; Interior Woodwork; Plumbing Work; Sheet-Metal Work; Heating Equipment; Gas and Electricity. Complete set of Plans for Modern Frame Dwelling. Plans for a School Building.

Set of Ten Full-Sized Blueprints for a Modern Dwelling — illustrated and described in the Blueprint Reading Book..**$1.00**

Other Up-to-Date Building Books

Brickwork, Plain and Fancy	$1.25
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The Slide Rule—How to Use It	1.00
The Steel Square—How to Use It	1.50

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(Continued from Page 35a)

keeping of reliable records and constitute a check to job changing. The report should prove a practical guide to labor employment offices and should be helpful to executives who desire to study this important phase of industrial relations.

Science the Key to Better Rural Living. Dr. C. J. Galpin of the United States Department of Agriculture, Washington, D. C., speaking recently before the American Country Life Association, struck an optimistic note when he pointed out that science is the key to social and spiritual improvement in rural life.

Dr. Galpin called attention to the fact that the spread of agriculture and the principles of homemaking since 1910 has reached a large part of the rural population of the country and that the accomplishments of the last few years have made it possible for the average modern farmer to know more of the science of the farming industry than the scientist knew fifty years ago.

The farmer's response to science as applied to the economics of his occupation, said Dr. Galpin, is a herald of science as applied to all human relationships. Science, said Dr. Galpin, will characterize the second period of natural rural life and will stand forth as the genius of its culture. As evidences he cited farmers' hospitals, rural libraries, modern farm homes, community clubhouses, athletic fields, swimming pools, consolidated schools, rural churches, and modern farmers' towns. In higher education, too, there is a noticeable increase in the number of college and university students studying rural sociology.

Weights of Woods Grown in the United States. The United States Forest Products Laboratory of Madison, Wisconsin, has issued a table and description showing the average weights of various woods grown in the United States. The weights are for material at the moisture condition of the trees when felled and the data are based on the weights and volumes of small, clear specimens from the top 4 ft. of 16-ft.-butt logs of typical trees. Wood thus selected averages a trifle heavier than the wood in ordinary structural timbers.

In any lot of lumber of a given species in the air-dry condition at twelve per cent moisture, the weight per cubic foot will rarely vary more than ten per cent from the figure in the table. In green material, on the other hand, the variation will be as great as twenty per cent, owing to wide differences in moisture content.

The greatest changes in weight are those which occur in the early stages of drying of green wood. Changes in the moisture content of air-dry wood are attended by relatively small changes in weight per cubic foot, owing to the effect of change in volume as a result of the shrinkage or swelling.

A practical rule for estimating the weight of air-dry or kiln-dry wood at a moisture content of twelve per cent, is to regard a one-half-per-cent change in weight as accompanying a one-per-cent change in moisture content. Wood at eight per cent moisture would weigh about two per cent less than at twelve per cent, while at fourteen per cent, the weight would be about one per cent more than at twelve per cent.

Testing the Hardness of Glue Joints. Woodworkers who find that glues are abrasive and that tools dull quickly in the machining of glued products will be interested in a test performed by the United States Forest Products Laboratory of Madison, Wisconsin, for determining the comparative hardness of joints made with different glues.

According to the method used, a number of pieces of wood (preferably softwoods) are glued together face to face, each individual joint being produced with one of the glues to be tested. After the laminated block has been allowed to condition for a week or more, one edge is cleaned of excess glue and squared up. The block is then run repeatedly over a jointer in such a way that each glue line passes over one spot in the cutter. The depths of the nicks caused by the hard glue lines are then a rough measure of the abrasive effect of the glues.

Because of the difficulty in detecting differences in nicks by a mere visual inspection, a means of comparison is afforded if a smoothly-planed softwood board is run across the dull knives. In this way the nicks show the result of jointing a laminated block in which seventeen different varieties of commercial glues are used.

Vocational Program Expanded in Baltimore. The program of vocational education in Baltimore has been expanded during the past year with the opening of a school for girls, the establishment of an industrial-arts course for teachers, and the introduction of new courses of study in a number of subjects. A continuous effort is made to fit the vocational program to the industrial and commercial needs of the city, and the vocational department works in close cooperation with the local civic, municipal, and trade organizations. The Girls' Vocational School was moved during the year to a new location which has been arranged especially for the purpose. The accommodations provide for at least 300 students. In addition to the trades of dressmaking and millinery which have been offered previously, there are now courses in personal hygiene, lunchroom and tearoom service, and power-machine operation. There are also prevocational courses for girls who are 13 years of age and who have completed

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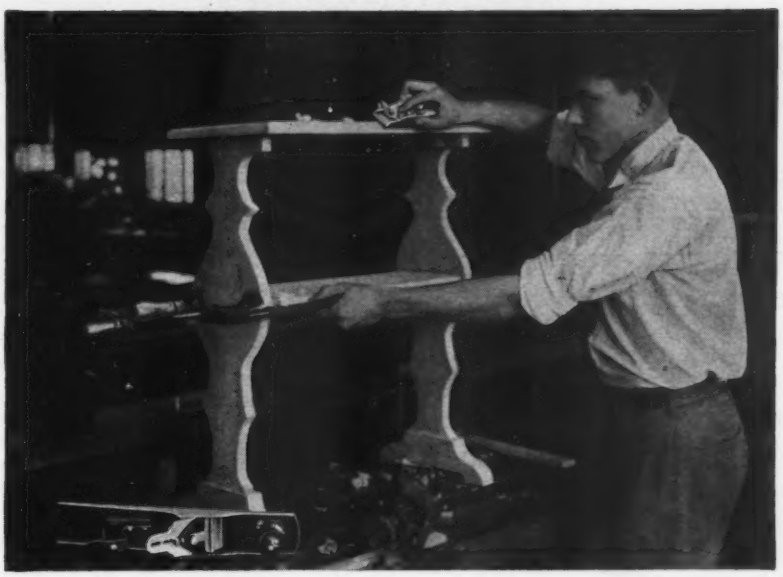


With Sargent tools students can do their best

Sargent Clamps Nos. 13, 16 and 22

YOUR students might do very good work with ordinary, every-day tools. But they should do the very best they are able when working with Sargent tools.

The Sargent Auto-Set Bench Plane is adapted to any need. The Auto-Set is solidly and rigidly built, strong and long-lasting. It has lots of room around the grips. It is lighter than the ordinary plane. Easily adjusted. And the chromium steel cutter, thin and durable, can be removed, sharpened, and put back in the plane at its original position without any readjusting. Sargent Auto-Sets are the finest planes on the market today. They save time and trouble. No school should be without them.

If you favor the old-style planes you can get just the size you want in our "400" line.

Sargent squares and Sargent clamps are worthy companions to Sargent planes. The squares are carefully marked and tested for accuracy. They come in all practical styles, and a variety of rust-proof finishes. We especially recommend Nos. 30-N and 30-B for your students. These have a body 18 x 1½ inches, and a tongue 12 x 1 inch. Sargent clamps are strong, durable and powerful. The screw is of steel. The head and swivel of malleable iron.

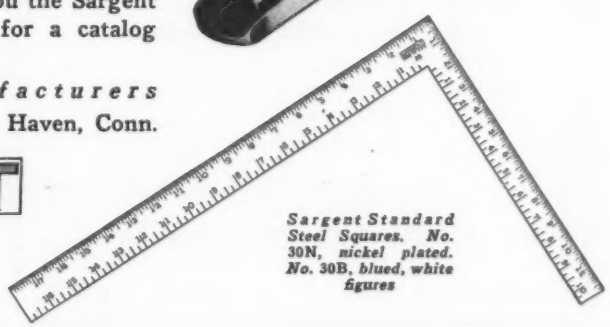
Give your students the best that can be had. You will be surprised at the moderate cost of Sargent tools. Ask your dealer to show you the Sargent line. Write us for a catalog and particulars.

Sargent Auto-Set Bench Plane No. 711

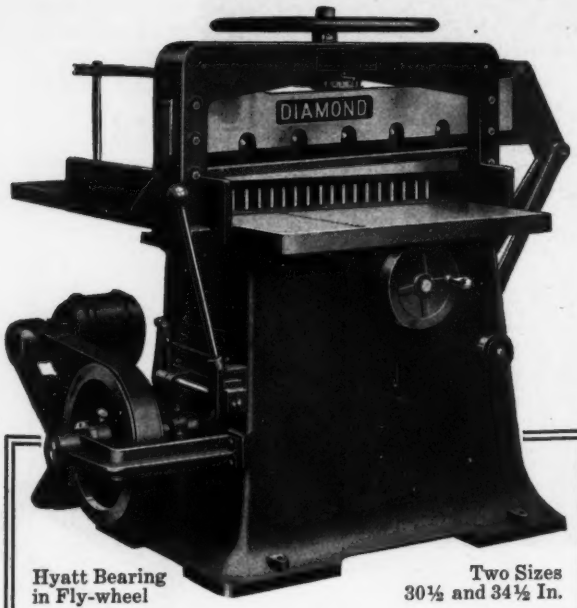
Sargent Adjustable Iron Bench Plane No. 411

SARGENT & COMPANY, *Manufacturers*
58 Water Street New Haven, Conn.

SARGENT
Tools & Hardware



Sargent Standard Steel Squares. No. 30N, nickel plated. No. 30B, blued, white figures



Hyatt Bearing in Fly-wheel

Two Sizes 30½ and 34½ In.

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Diamond Cutters are also made as Lever Cutters to which Power Fixtures can be easily attached

Send for full information regarding Diamond Cutters and for literature describing any of the following machines and utilities used throughout the world in the Graphic Arts:

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Challenge Notched Iron Furniture
Challenge Semi-Steel Imposing Surfaces
Challenge Pressed Steel Galleys
Challenge Rigid Rim Galleys
Challenge Iron Sectional Blocks and Hooks
Challenge Type-High Gauges
Challenge Quoins and Keys

The Challenge Machinery Co.
GRAND HAVEN, MICHIGAN

Chicago, 17-19 E. Austin Ave. New York, 220 W. 19th St.

(Continued from Page 36a)

the fourth grade and are looking forward to employment when they have completed the required schoolwork. It is believed a number of these students will be induced to remain through the vocational course. Those who do not remain in school are able to gain a great deal during the one year of prevocational training.

Issue Book on Wood Construction. The United States Department of Commerce has announced the early publication of a book on "The Economics of Wood Utilization in Construction." The book is being prepared by the National Committee on Wood Utilization and is written on a broad basis which covers the economies of wood utilization in building and construction. The book is the work of a committee representing the American Institute of Architects, the American Society of Civil Engineers, the Associated General Contractors of America, the National Association of Builders' Exchanges, the American Society of Agricultural Engineers, the National Association of Highway Officials, the American Railway Association, and other similar groups of organized lumber consumers and will meet a need for adequate information on the subjects covering properties of woods used in construction, the erection of small houses and farm buildings, the erection of industrial and miscellaneous buildings, roof trusses and arches, bridges, and trestles, and wharves and docks.

Conference on Welding Planned. A conference embracing all phases of the welding industry will be held October 20, 21, and 22 at the University of Minnesota. The conference is the first to be held at the University but it is expected that it will prove a yearly event. Considerable time at the conference will be given to papers submitted by practical welders as well as to round-table discussions led by experts in the field.

Vocational School Opened in Lemon City, Florida. The vocational department at Miami, Florida, has announced the opening of the new agricultural high school, which has been erected in Lemon City within the limits of Miami. The school will eventually become a real vocational school. At present, the school offers a course in building engineering which is open to high-school students and which offers both practical and technical work related to the trade. Under the practical courses are included carpentry, masonry, electricity, as they pertain to the building industries, some experience in plumbing, and a knowledge of sanitation. The technical courses include architectural drafting, estimating, trade mathematics, trade science, and trade law.

The faculty of the school of building engineering comprises Mr. C. M. Davison, who has charge of the related work in building engineering, and who teaches architecture, trade mathematics, estimating, trade science, trade law, and building regulations; Mr. Charles C. Stoker, who gives instruction in carpentry, practical building operations, and allied building trades; and Mr. R. L. Collins, who has charge of the machine equipment and the organizing of the shops.

The school is located on the grounds of the Agricultural High School and is equipped with the best of modern machinery and other necessary equipment. No tuition fee is required for any of the courses offered. The school opened for its first session on September 19.

New Funds for Vocational Education in Alabama. The new fund made available for vocational education in Alabama for the next fiscal year is $100,000 and increases to $200,000 by the close of the quadrenium. While there is no fixed plan for distributing the fund, a definite policy has been followed in the establishment of vocational classes, which allows the allocation of the fund in such a way as to provide comparable vocational facilities throughout the state for the training of young men and women, as well as for the instruction of adult groups. An expansion of the trade and agricultural work is planned. Surveys will be made of possible locations for vocational centers where classes in vocational education may be organized.

Trade and Part-Time Education in Detroit. The all-day trade classes in the part-time schools of Detroit, Michigan, are intended for boys preparing to enter employment, and offer apprenticeship training in the skilled trades. These classes are conducted in eight schools. Machine-shop work is offered in all the centers and auto mechanics in two schools. For girls, classes in trade dressmaking, homemaking, millinery, and cafeteria work are conducted in one of the centers. All-day trade work in printing is offered in another center, while plumbing classes are conducted in the building-trades school.

The George School which has been equipped for use as a junior trade school for boys is intended to serve the group who wish to take a short, intensive training before going to work. An effort is made to assist the boys in the choice of a vocation, to train them as soon as possible for entering employment, and to help them secure work where their training will be continued by the employer and part-time classes. This building also houses the boys' adjustment class, which was formerly housed in the Cass Technical High School. The George School has the following shop equipment: General metal work, general woodworking, machine shop, electrical work, and sheet-metal work.

Industrial-Art School Opens in New York City. The New York Evening School of Industrial Art, located on East 42nd St., New York City, was opened the second week in September. Students

(Continued on Page 40a)

PRINT SHOP OF PORTOLA JUNIOR HIGH SCHOOL, SAN FRANCISCO, CAL.

In this illustration is shown the American School Type Cabinet which is recommended for use in School Printing Equipments. It is of cabinet construction, with case brackets, steel case slides (not wood) and legs which may be cut off, if desired, to adapt the cabinet to the correct height for the individual student.

and now it is Printing in the Junior High School

IN the past two years San Francisco has installed eight school printing outfits in her schools, most of them in the Junior High Schools. Having started with the installation of one school printing outfit, it is only logical to believe that educational benefits derived from the first outfit justified the installation of the other print shops.

Printing is educational. As an accessory subject in the teaching of those subjects that have a cultural objective it is unsurpassed.

English and its allied branches, as well as arithmetic and art, are easily coördinated with Printing. The romantic history and the parallel growth of Printing with civilization make it a logical subject to be taught in education.

Hundreds of schools are installing printing —why not install printing in your schools?

Write today for information concerning the proper size outfit, the educational value of the subject, the qualifications of the successful teacher, or any other information you may desire concerning that most popular subject—PRINTING. *Suggestions for practical outfits for any type of school, located in any community—country, suburban, or city—will be sent upon request.*

F. K. PHILLIPS, *Manager,* EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, JERSEY CITY, N. J.

Be it ever so humble there's no job like your own

IN no work that a boy encounters, can he take as much pride as he does in the things that he builds. For these are his own—tangible evidences of his developing skill.

Give him a wood that will let him do his best: American Walnut. It's proof against cracking and warping. And its texture will give real beauty to even the simplest of handicraft.

Boys do better work with walnut, because they know their work will endure. And it costs so very little more than inferior woods!

We have some interesting booklets on walnut and its uses. Would you like copies?

American Walnut Manufacturers Association
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Please send me your brochures on American Walnut

Name.....

Address.....

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eligible to the classes are those engaged in some phase of artwork in the industrial field, or art students and artists about to engage in some applied artwork. Instruction and materials are free to students.

The school offers instruction in drawing, composition, poster design, costume design, interior decoration, mural painting, modeling and sculpture work, wood carving, batik work, woodblock printing, stenciling, and textile design. The classes in drawing, color, and composition are taught by trained instructors who comprise the faculty.

Automotive School Opened. An automotive school has been opened at Springfield, Ohio, with the opening of the school year. Mr. Wm. R. Roberts of Columbus, has been employed as director, at a salary of $2,300 a year. The plans call for a three-year course of study and a diploma to be awarded to those who complete the course. A class of from fifteen to twenty students will be accommodated.

Missouri Schools Receive Large Sum for Vocational Work. Missouri schools maintaining agricultural, industrial, and home-economics training courses have been given a reimbursement by the state amounting to a total of $197,910. Of this amount, the agricultural school received $106,712; the trade and industrial schools, $67,758; and the home-economics schools, $23,315.

Animal Husbandry and Farm Shopwork at Clear Lake, S. Dak. The vocational agriculture course in the high school, Clear Lake, S. Dak., has been enlarged in scope this year with the addition of work in animal husbandry and farm shopwork. The former will include work with cattle, sheep, hogs, horses, and poultry. The latter will embrace instruction in woodwork, auto mechanics, blacksmithing, harness repair, and repairwork on farm equipment.

Huntsville Gets Vocational School. Huntsville, in Alabama, has been selected as one of the locations for a new agricultural high school.

Tech Short Course Held at Arkansas Polytechnic College. An intensive short course of one week was held in connection with a conference of Smith-Hughes instructors at the Arkansas Polytechnic College at Russellville, Ark. Students were given training in livestock, milk, small grains, and poultry.

Establish Part-Time Class in Commercial Subjects. The Hominy High School at Hominy, Oklahoma, has enlarged the work of the vocational trade school with the addition of a part-time trade extension class in commercial subjects. The school is being conducted from 4:00 to 5:00 p.m. four afternoons each week, for a period of nine months, and is open to employees in the various business establishments of the city. Last year the school conducted an evening trade school for carpenters as a means of making employees in the trade more efficient. The work is conducted under the provisions of the Smith-Hughes vocational law.

Chicago Evening Schools Add New Courses. The evening schools of Chicago will offer courses in seven different departments, as well as credit for advanced work, during the ensuing school year. The 31 schools offer a year's work divided into two terms, and embrace one or more lines of work such as elementary grade work, English for foreigners, and high-school courses both technical and commercial. Seven schools offer technical evening courses. Many schools have a manual-training course for boys and cooking and sewing for girls.

New Agricultural Building Completed. A vocational agricultural building has been completed at Sidney, Nebr.

Smith-Hughes Projects for 1927-28 School Year. Twenty-seven students of the Big Sandy, Montana, High School and three from the outside, who took the Smith-Hughes work under N. H. Bovee, local extension agent, have taken projects in vocational agriculture for 1927-28. Among the projects undertaken are the raising of spring wheat, winter rye, corn, potatoes, livestock, capons, and geese. There are 350 capons, 25 geese, 13 sheep, and 10 hogs being raised.

Rapid Progress of Industrial Education in Virginia. A total of 189 trade and industrial classes were conducted last year in Virginia, with an enrollment of 5,800 students. This represents an increase of 48 classes and 1,965 students over the previous year.

Of the students taking trade work, 724 were employed in the industries and in stores and were relieved from their work to continue their education in part-time classes; 779 were foremen and other industrial executives who attended classes on industrial management and personnel problems; 101 were teachers taking professional courses, and the remainder were workers in the industries or prospective workers who attended night classes or day trade classes to learn the details of their respective vocations.

Classes were conducted in 32 different trades or vocations last year, including foremanship, retail selling, plumbing, bricklaying, plastering, machine design, carpentry, millwork, architectural and mechanical drafting, loom fixing, coal mining, silkmill operation, automobile mechanics, machine-shop practice, house wiring, tailoring, printing, weaving, shipbuilding, patternmaking, shoe cutting, show-card writing, radio operation, dressmaking, nursing, domestice service, drawing, mathematics, and science.